The University of Warwick
Department of Engineering
Manufacturing Systems Engineering

Integrated Graduate Development Scheme
Engineering Doctorate

Submission to Portfolio

Submission 11

Executive Summary on "Strategic Change Management toward Agile Manufacturing - A Hong Kong Experience"

Submission Date : September 23, 1997

Name : Wai-Kwok LO

Company : Computer Products Asia-Pacific Ltd.

ACKNOWLEDGEMENT

I would like to express my deepest gratitude to my academic mentors Mr. John Hill and Prof. W.B. Lee, and my industrial mentor Dr. Raymond C.T. Ho for their guidance, enlightenment, inspiration, criticism and support during the process of this study.

W.K. Lo

May 1997

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Executive Summary

Title of Portfolio : Strategic Change Management toward Agile Manufacturing - a Hong Kong Experience

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Abstract

This paper is the executive summary of the portfolio of the author toward the award of Engineering Doctorate of the Warwick University. The title of the portfolio is the same as the title of this paper, which serves as a tool to integrate the works of the author in the whole portfolio. There are ten other papers in the portfolio besides this one.

The development and implementation of the author's model of Strategic Change Management (SCM) in a power supply manufacturing company in Hong Kong leading to Agility (AG) is presented in the paper. SCM developed by the author is a comprehensive and practical model that a company can use to improve various aspects of its business. The author has demonstrated this in the areas of Total Quality Management and ISO9000 implementation, technology innovation, supply chain management, renovation of information systems, etc. Three mini research projects are included in the portfolio, including the development of a What-if prototype to tackle a common problem in manufacturing resources planning, the design of power supply products for mass customization, and an empirical study on the factor structures and correlations of employee job satisfaction (SAT), organisation excellence (EX) and agility (AG).

The SCM model starts with creating the culture for change, which the author sees as the role for the top management of the organisation. The author presents his experience to create such culture when he was parachuted into his organisation as the chief executive. The second step of SCM is analysing the system. A comprehensive qualitative analysis of the economical, social and cultural environment of the company as well as the market forces is given. The step that follows is the implementation of changes, which is a cycle of setting priority, organising, performance measurement, rewarding winners and reinforcement. Practical approaches to tackle the changes in various stages of the cycle are presented.

SCM has helped in transforming the company toward agility, and the stage of agility is named Agility Chain by the author. The result of such transformation is also evaluated from the angles of operations performance, financial performance, stock price appreciation, and the change in market perception. The empirical study of employees perception on SAT, EX and AG indicates strong correlations among the three factor structures, and also indicates that the company is moving toward agility under the author's strategic change management.

1. Introduction

The title of the portfolio is "Strategic Change Management Toward Agile Manufacturing - A Hong Kong Experience". The three key words underlined need some explanation and elaboration.

Strategic Change Management (SCM)

There are many publications on change management. A lot of management thinkers like Edwards Deming[1], Peter Drucker[2], etc., talked about managing changes or about management theory in the age of change. The author sees change management as a concept with extremely long history.

In "The Great Learning"[3], the famous ancient Chinese philosophy book transmitted by the Confucian School, there is an important motto about changes which says "If you can one day renovate yourself, do so from day to day. Yea, let there be daily renovation." Such continuous effort to change or renovate would only stop in a stage when perfection could be achieved - "to rest in the highest excellence"[4], quoted from the same book. While a lot of modern management terms are invented - Kaizen[5], Reengineering[6], Liberation Management[7], etc., they are all addressing the very fundamental aspect of management - Change Management. Some management writers criticise the use of the term change as it refers only to incremental improvement. The author disagrees to this view because the term change itself has no bias toward incremental or radical improvement. A change can be a continuous and incremental

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1 Delavigne, K.T. & Robertson, J.D., *Deming's Profound Changes*, PTR Prentice Hall, 1994 [ISBN 0-13-292690-3]

2 Drucker, Peter F., Management in a Time of Great Change, Truman Talley Books/Dutton, New York, 1995 [ISBN 0-525-94053-7]

3 Legge, James, *The Chinese Classics Vol. I & II*, SMC Publishing Inc., Taipei, 1994, p.361. [ISBN 957-638-039-1]

4 Legge, James, *The Chinese Classics Vol. I & II*, SMC Publishing Inc., Taipei, 1994, p.356. [ISBN 957-638-039-1]

5 Imai, Masaake, *Kaizen - The Key to Japan's Competitive Success*, Mc-Graw-Hill International Editions, 1986. [ISBN 0-07-112647-3]

6 Hammer, Michael & Champy, James, *Reengineering the Corporation*, Nicholas Brealey Publishing, 1995, p.32 to 33. [ISBN 1-85788-056-0]

7 Peters, Tom, *Liberation Management*, Alfred A. Knopf, Publisher, New York, 11/1992. [ISBN 0-394-55999-1]

improvement, or a radical, discontinuous shift. The author also sees that for the chief executive or any senior managers in an organisation, the key role is to manage changes at a strategic level, and thus the term Strategic Change Management (SCM) is used in this study.

Agile Manufacturing

The terms Agility and Agility Manufacturing have drawn a lot of attention in the world of business management ever since the Iacocca Institute at Lehigh University issued its report on agility. The key finding of the report[8] is that there is a common infrastructure requirement for all agile manufacturing enterprises, regardless of their industrial sectors. While the study of the Iacocca Institute is aimed to provoke the actions that need to be taken in order to restore the United States to world leadership in manufacturing, it concludes that all the world's leading manufacturers have to build a new infrastructure to make the transition from mass production to agile manufacturing, and this provides a unique opportunity for U.S. industry to regain the leadership lost in the 1970s and 80s.

The author sees that this movement toward agility and the fruitful results obtained are evident by the success of Microsoft in the software industry, Intel in the memory industry and Motorola in the wireless communication industry. He also believes that his strategic change management programme implemented in his company Computer Products Asia-Pacific Ltd. (also trading as Power Conversion Asia-Pacific, PCAP) leads to agility. An assessment on employee job satisfaction, organisation excellence and agility is conducted in the later part of the study. It is reported in section 5.4 of this executive summary.

Hong Kong Experience

This portfolio is focused on the actual change management strategies that the author developed and implemented in his company in Hong Kong since he was parachuted into the organisation in mid 1988 as Managing Director. The strategies are developed within the boundary constrained by the corporate organisation, and the cultural, economical and social context of Hong Kong.

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[8] Nagel, R. & Dove R. (Principal Investigators), *21st century Manufacturing Enterprise Strategy*, Iacocca Institute, Lehigh University, 1991, [ISBN 0-9624866-3-9]

There are unique threats and opportunities that the company faces by operating in Hong Kong, one of which is the China opportunity. This report will become meaningless without referring to such boundary. Hong Kong experiences are always quoted in the Submissions, especially Submissions 1, 2, 3, and 5.

1.1 Explanation of the Portfolio Structure

The Portfolio is broad based. It is structured using the Umbrella Approach (Figure 1). There are totally eleven (11) Submissions.

Submissions 1, 3, 4, 5, 6, 7, 8, and 9 are papers and mini-projects. Each of these eight Submissions can be read as independent papers.

Submission 2 is a paper which gives the readers a background about the manufacturing industries in Hong Kong. Reading this paper helps the readers recognise the social, cultural and economic boundary within which the present study is carried out.

Submission 10 is the Personal Profile of the author. This gives the readers another angle of the background of the study.

Submission 11 is the Executive Summary which serves an important purpose as to integrate these papers together under the main theme of Strategic Change Management.

The titles of the eleven Submissions are :

Submission 1 : Paper on **"ISO9000, Foundation for TQM : A Hong Kong Experience in Achieving Operational Excellence through Evolutionary Changes"**

Submission 2 : Paper on **"Development of Manufacturing Industries in Hong Kong"**

Submission 3 : Paper on **"Application of Deming's Principles in the Management of Change - A Hong Kong Experience"**

Submission 4 : Paper on **"Beyond Technological Innovation - Delivering Value to our Customers"**

Submission 5 : Paper on **"Total Quality Management of the Supply Chain Logistics in Computer Products Asia-Pacific Ltd."**

Submission 6 : Paper on **"Renovating Information Systems to Achieve Competitive Advantage - Development of the Strategy"**

Submission 7 : Project on **"Review of a Common Problem in MRP II Systems and Development of a What-if Prototype to Tackle Dynamic Changes in a Flexible Electronics Manufacturing System"**

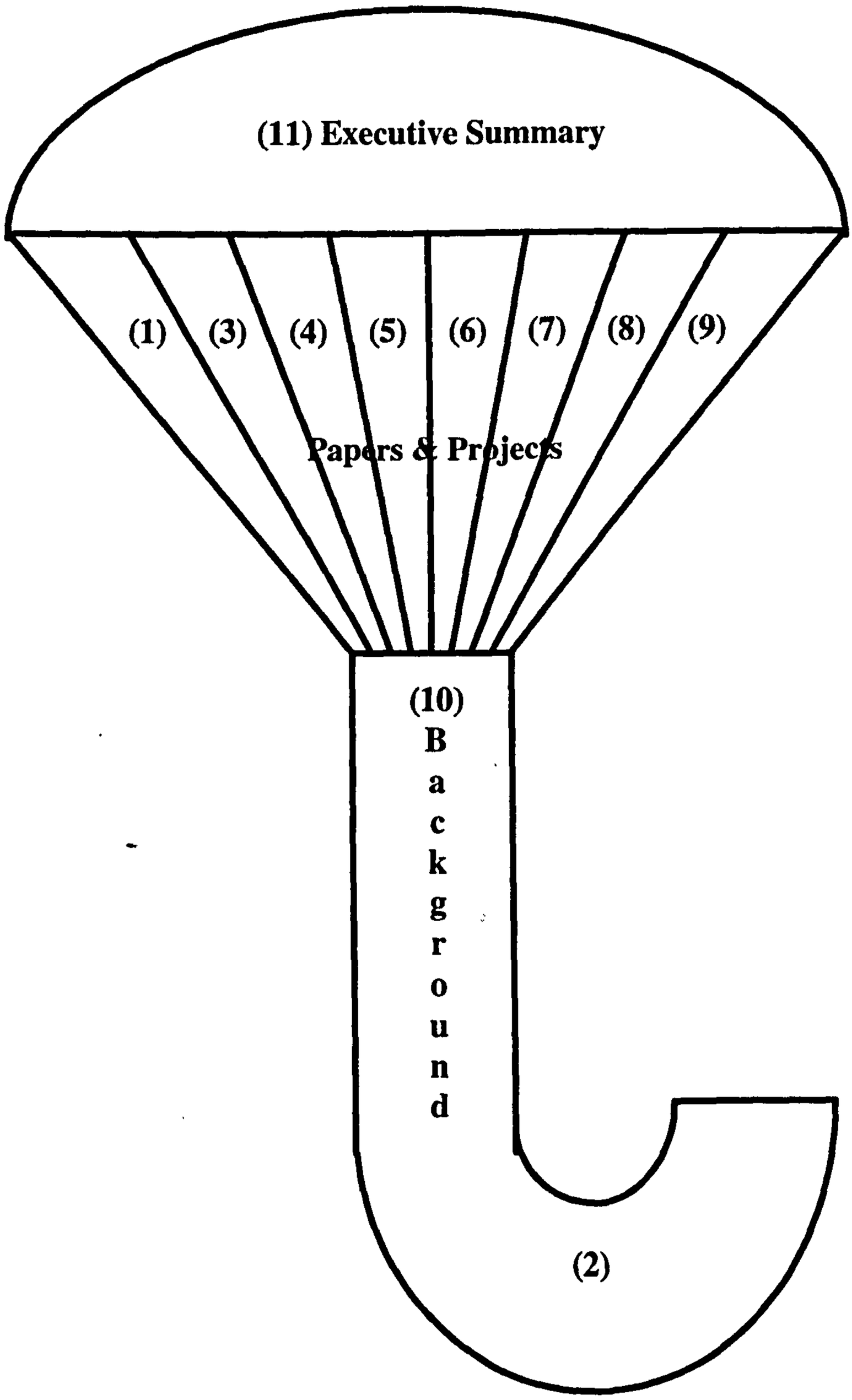
Submission 8 : Project on **"An Empirical Study of Employee Job Satisfaction, Organisation Excellence and Agility - Their Factor Structures and Correlations"**

Submission 9 : Project on **"Design of Electronic Products for Mass Customization"**

Submission 10 : **Personal Profile**

Submission 11 : **Executive Summary** on **"Strategic Change Management toward Agile Manufacturing - A Hong Kong Experience"**

Figure 1 The Umbrella Approach



1.2 Suggested Sequence of Reading the Submissions

For readers who cannot afford the time to go through all the Submissions, the suggested readings are : Submission 10 ⇒ Submission 11

For readers who want to know more about the background of the manufacturing industries in Hong Kong, the suggested readings are : Submission 2 ⇒ Submission 10 ⇒ Submission 11

After going through the above, for readers who are interested in more details of different aspects of Strategic Change Management, the suggested readings are :

- ISO9000, TQM and Deming's Principles : Submissions 1 and 3
- Supply Chain : Submission 5
- Information Systems : Submissions 6 and 7
- Technology Innovation : Submission 4
- Mass Customization : Submission 9
- Satisfaction, Excellence and Agility : Submission 8

1.3 4 Management Thinkers who Affected the Author's Change Management Strategies

1.3.1 Deming - 14 Principles

The concept of Deming has been promoted in PCAP for many years. Back to 1987, several department heads of PCAP were sent to the Deming's School in the USA for training. When he took the chief executive position of the company in 1988, the author found that the Fourteen Management Principles (Table 1) were of particular applicability in PCAP where a culture for change needed to be established. Deming's management theory has a great influence in Japanese industries. The Deming award has been the standard of excellence in quality for many years in Japan.

Table 1 Deming's 14 Principles

1. Create constancy of purpose toward improvement of product and service.
2. Adopt the new philosophy.
3. Cease dependence on mass inspection.
4. Cease award of business on price tag alone.
5. Improve constantly and forever the system of product and service.
6. Institute training.
7. Adopt and institute leadership.
8. Drive out fear.
9. Break down the barriers between departments.
10. Eliminate slogans, exhortations and targets for the work force.
11. Eliminate numerical quotes for the work force and numerical goals for management.
12. Remove barriers that deny people's pride of workmanship.
13. Institute a vigorous programme of education and self-improvement.
14. Take action to accomplish the transformation.

Submission 3 gives a very detailed report of how the Fourteen Principles are applied in PCAP[9]. It describes how PCAP excels in its operations and manages the improvement through the application of these principles. It shows that improving quality can lead to substantial bottom line business success and growth. However, to achieve such success is a difficult task. Among the Fourteen Principles, the author sees seven principles (2, 4, 5, 6, 9, 12 and 13) of particular importance for the changing of the employees' mind set and behaviour, per his experience in PCAP.

[9] Submission 3, *Application of Deming's Principles in the Management of Change - A Hong Kong Experience*

1.3.2 Tom Peters - Thriving on Chaos

Tom Peters[10] described the four forces that turn the market upside down as :

- Generic uncertainty
- Technology revolution
- New competitors
- Changing tastes

PCAP designs, manufactures and markets power supplies and converters to the world-wide market of datacommunication and telecommunication which is a highly competitive and rapidly changing market. The author sees that the forces PCAP faces are no different from those perceived by Tom Peters. The outcomes as expressed by Peters are :

- Uncertainty
- End of isolation
- Demise of mass
- More choices
- Market fragmentation
- Product & service explosion
- Demand for quality and fast response
- More complexity
- Midsize firms

PCAP fits very well into such a scenario. It is of a size of US$100M, a midsize electronics firm in a very fragmented power supply market which demands quality and fast response. The customers require increased choices and complexity of the power supplies. Today, a power supply is more than a device to provide power. It is a monitor and control device of the electronic equipment as well because from the operations of the power supply, the functioning of the equipment can be checked. The comfort and luxury of traditional mass

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[10] Peter, Tom, *Thriving on Chaos*, Pan Books, 1989 [ISBN 0-330-30591-3]

production with production lines running on the same products day by day have gone. PCAP produces over 800 models a year now with some running at several hundred thousand pieces a year, and some only several hundred pieces a year. It also introduces over 200 new power supplies and converters a year. It is a big challenge for the author to manage such a complex business satisfying the increasingly demanding customers with respect to Technology, Quality, Responsiveness, Delivery and Cost. Peters describes the shape of winners under such chaos as :

- Niche-oriented market creators
- Flat
- Fast
- Quality-conscious
- Internationalist (even if small)
- Smaller
- Gain Sharing, participation, adding value through people

The strategic changes developed and implemented by the author in PCAP are related to these goals.

1.3.3 Schonberger - World Class Manufacturing

The concept of World Class Manufacturing (WCM) has been promoted by the author in PCAP since 1988. Schonberger[11] explains the concept using the motto of the Olympic Games : *citius, altius, fortius* which means "faster, higher, stronger". He also says that the WCM equivalent is continual and rapid improvement, and such improvement is directed toward quality, cost, lead time, customer service and flexibility.

In PCAP, the concept of WCM is summarised into four key elements[12] :

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[11] Schonberger, Richard J., *World Class Manufacturing - The Lessons of Simplicity Applied*, Collier Macmillan Publishers, London, 1986. [ISBN 0-02-929270-0]

[12] Submission 1, *ISO9000, Foundation for TQM : A Hong Kong Experience in Achieving Operational Excellence through Evolutionary Changes*, p. 9.

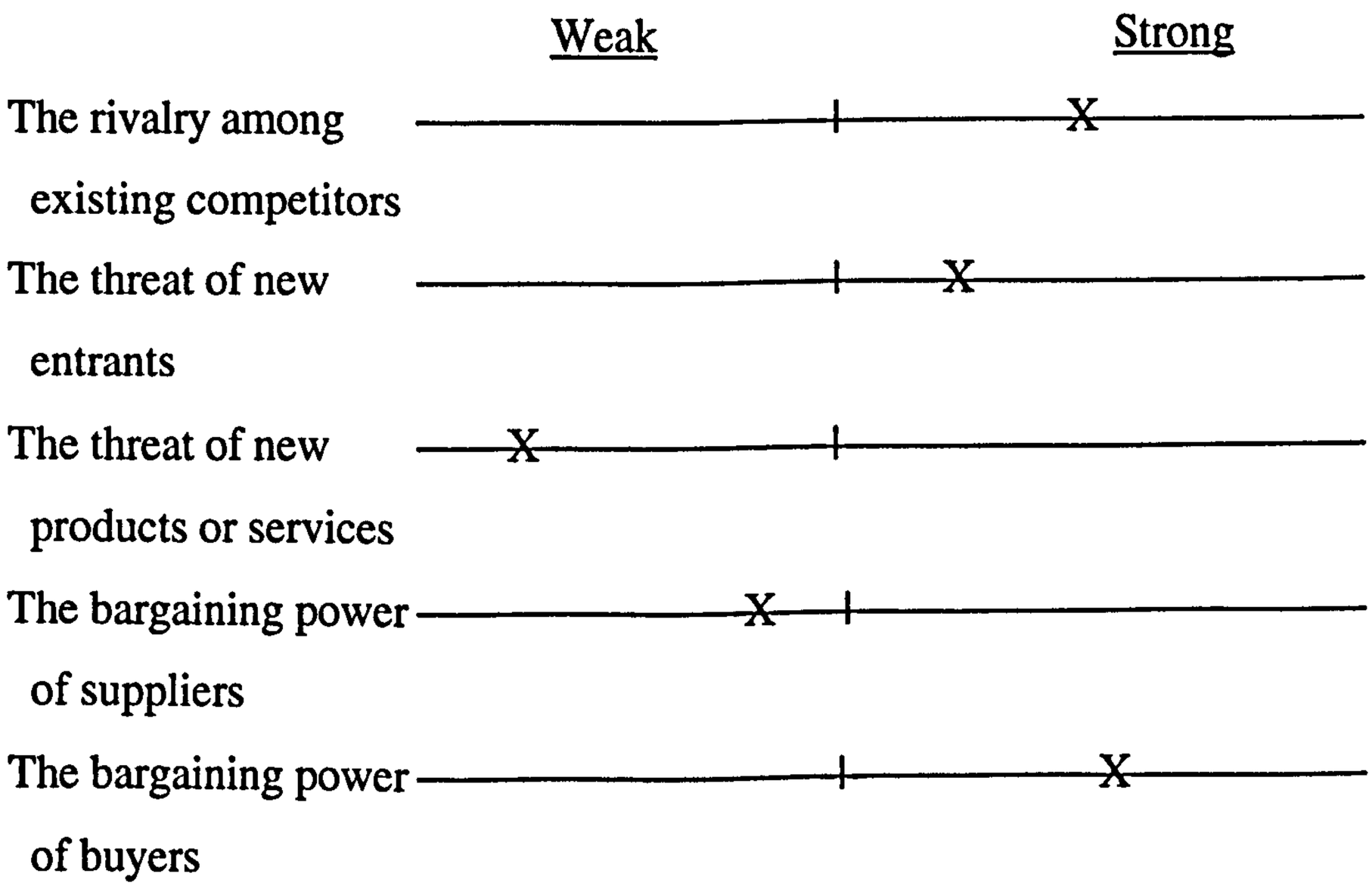
1. Products of superior quality and reliability.
2. Responsiveness to customer needs.
3. Customers' total satisfaction
4. Unquestioned honesty, fairness, and integrity.

Establishing WCM as the ultimate goal, employees are encouraged to improve every aspect of the operations. Quality and customer satisfaction ought to be a conscious part of every step of the product cycle, from design to manufacture, to delivery and after sales service, etc. Action plans to achieve the goals are included in the annual business plan of PCAP every year.

1.3.4 Michael Porter - Competitive Forces & Competitive Advantage

According to Michael Porter[13], the state of competition depends upon the interaction of five basic competitive forces which are threat of new entry, intensity of rivalry amongst competitors, threat of substitutes, bargaining power of buyers, and bargaining power of suppliers. The strength of the competitive forces that PCAP is facing is illustrated as below (Figure 2):

Figure 2 : The Competitive Forces



[13] Michael Porter, *Competitive Advantage*, Free Press, 1985. [ISBN 0-02-925090-0]

a. The Rivalry Among Existing Competitors — Strong

Because of the low entry barrier in terms of technology and investment, there is high level of fragmentation of power supplies manufacturers in the industry. (In 1994 the world-wide market of power supplies was about US$13 billion of which US$4 billion was directly available to merchant suppliers such as Computer Products. However, even the largest power supply player had annual sales of no more than US$500 million. With US$100 million annual sales, Computer Products was among the top ten). Major competitors include Astec, Lambda, Delta, Vicor, Zytec, etc. Some of these competitors are well-known for their technology, some compete on price.

b. The Threat of New Entrants — Strong

The power supply is a fundamental component of all electronic equipment and represents a significant portion of the cost and weight of the electronic products. Unlike the trends in semiconductor technology, there have not been "overnight breakthroughs" in recent years regarding switching power supplies. The manufacturing equipment and machines needed for power supplies are standard electronic assembly equipment and machines including component insertion, transformer winder, wave soldering, testing and burn-in, etc. Therefore, power supplies are always considered relatively easy to manufacture. Of course, whether a company masters the techniques and management skills to manufacture power supplies to high quality and reliability at a competitive cost is a different story.

c. The Threat of New Products or Services — Weak

The power supply is the heart of any piece of electronic equipment, be it a computer, a telephone switching system, or a surgical tool. In the foreseeable future, the power supply (and converter) will continue to be an

important product line in the electronics industry and there is unlikely to be any substitute.

d. The Bargaining Power of Suppliers — Weak

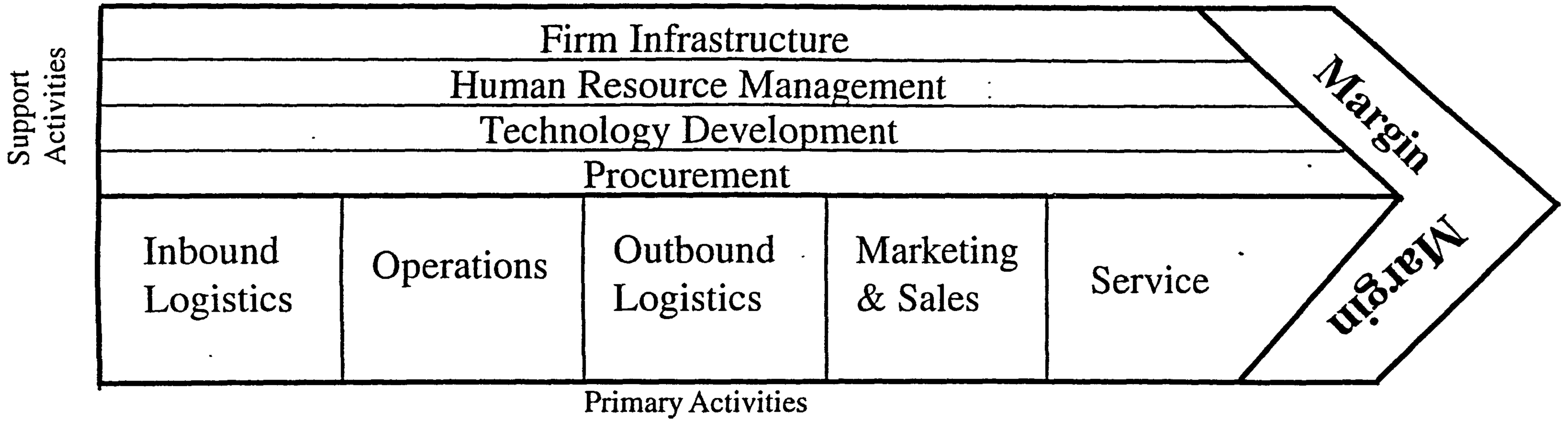
Major components used in power supplies (and converters) are electrolytic capacitors, semiconductors, ferrites, PC boards and sheet metals. These are major product lines in the electronic components market in the world. PCAP is now procuring around US$70 million worth of electronic components in a year. This volume puts the company in a good position to build up a direct relationship with major vendors such as Motorola, NCC, and others. Through the strong PCAP materials team, the company has been able to reduce around 5% of the materials cost each year.

e. The Bargaining Power of Buyers — Strong

Because of the availability of big numbers of power supplies (and converters) makers in the world, the customers are in a strong bargaining position. This bargaining power causes the profit margin of power supplies to drop. The actual choices, however, are less if a customer is keen on technology, quality and reliability.

The Generic Value Chain (Figure 3) of Porter provides a very good tool for a company to diagnose its competitive advantage. Based on his experience in PCAP, the author developed from the Generic Value Chain and the concept of Agility a new value chain he named the Agility Chain. This is discussed in Section 4 of this paper.

Figure 3 The Generic Value Chain from Michael Porter



1.4 Evolution Vs Revolution

Michael Hammer[14] advocates "Reengineering" as the path to change. He defines Reengineering as "the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed." He emphasises that the changes have to be fundamental, radical and dramatic, which are a kind of revolutionary changes.

The author sees the fourth key word "processes" in Hammer's definition of strategic importance but does not agree that the changes have to be revolutionary. What affect a business most are the cross departmental processes and not the individual departments. This is why the author used a lot of cross-functional and cross-divisional task forces in his implementation of changes. But should these changes only be revolutionary? The answer from the author is "no". Van Der Erve[15] says that revolution as struggle prevents resonance and harmony, while revolution as an evolutionary phase of mutation and selection doesn't. Major changes do not necessarily require a struggle to come about. This is particular true in the Eastern world, e.g., Japan and China, that resonance and harmony are considered the key to success in an organisation. In another ancient Chinese book of philosophy, "The Doctrine of the Mean", there is a very clear description of the importance of harmony. It says that, "Let the states of equilibrium and harmony exist in perfection, and a happy order will prevail throughout heaven and earth, and all things will be nourished and flourish." and that, "This equilibrium is the great root from which grow all the human actings in the world, and this harmony is the universal path which they all should pursue."[16]

In PCAP, the author has adopted a style of evolutionary change management, as shown in Submission 1.

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[14] Hammer, Michael & Champy, James, *Reengineering the Corporation*, Nicholas Brealey Publishing, 1995. [ISBN 1-85788-056-0]

[15] Erve, Marc van der, *Evolution Management - Winning in Tomorrow's Marketplace*, Butterworth Heinemann, 1994, p.21. [ISBN 0-7506-1879-5]

[16] Legge, James, *The Chinese Classics Vol. I & II*, SMC Publishing Inc., Taipei, 1994, p. 384 & 385. [ISBN 957-638-039-1]

1.5 Contexts of Change

1.5.1 6 Contexts of Change - Tony Eccles

Tony Eccles[17] says that the achievable rate of strategic change will vary greatly from firm to firm, depending on the general preparedness of each organisation and on the power concentration that can be brought to bear on the change process. That power concentration, in turn, depends substantially on the way in which the senior personnel have reached the top and on the kind of organisation it is. He elaborates further that with the focus mainly on management, six alternative change contexts are relevant :

1. Take-over change where a change of top management arises from the firm being taken over and a new top person/team installed.
2. Injection change when the firm's owners or the board decide that an outsider should be brought in to become chief executive.
3. Succession change when the top person, or perhaps the top team, is replaced from within as the old controllers retire or move on.
4. Renovation change when the existing top team realises that a new strategy is required and itself seeks to shift the organisation into a new mode.
5. Partnership change where the organisation is not so obviously a power structure but more a collegial, federal body of autonomous equals who can only be persuaded to change, but not instructed. This is typical of a professional service organisation.
6. Catalytic change in which an agency, typically a set of consultants or advisers, intervenes on behalf of one or more stakeholders, usually the management.

He shows a general gradient from context to context, from power to persuasion, as the power available to the change initiators dwindles (Figure 4).

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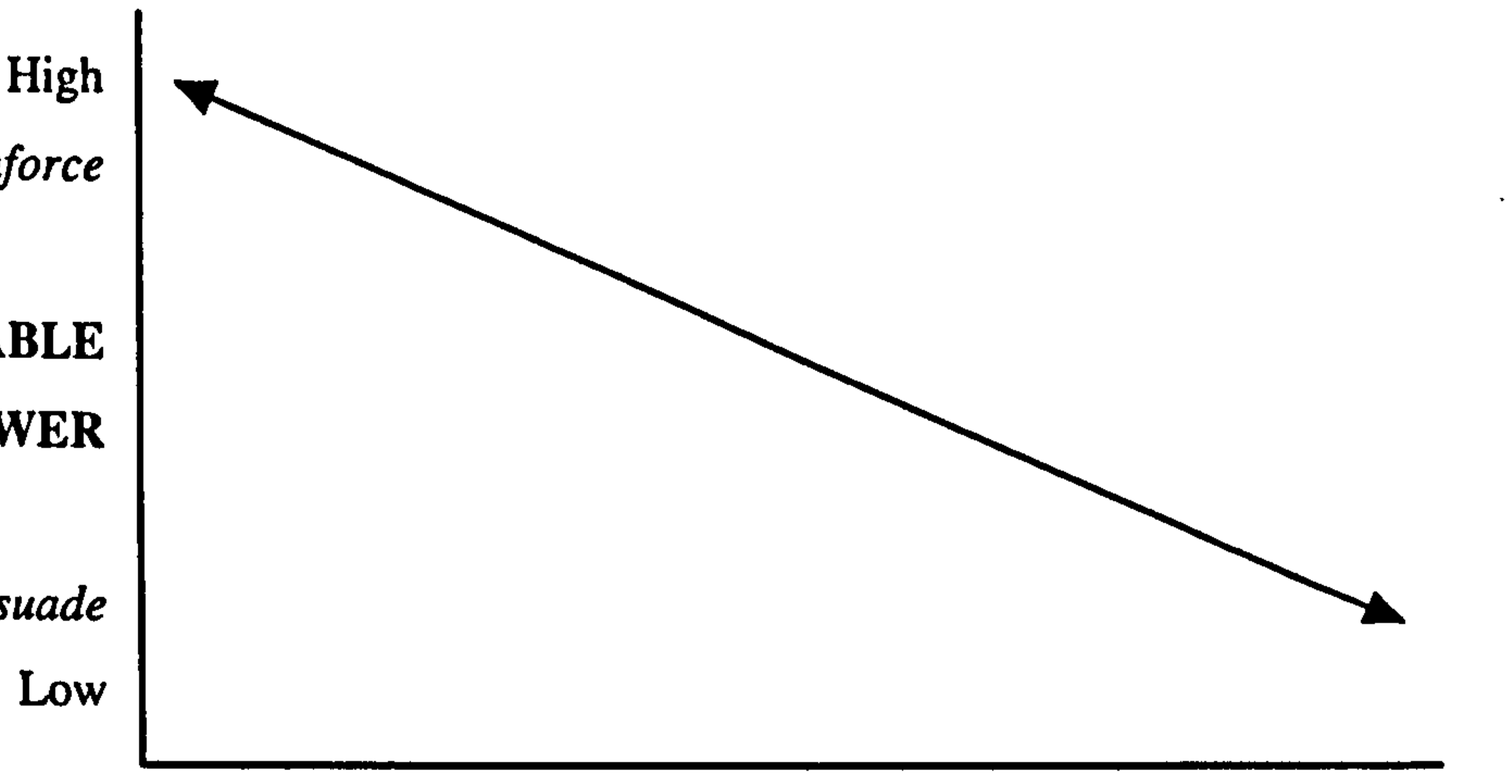
[17] Eccles, Tony, *Succeeding with Change,* McGraw-Hill Book Co., 1994, p. 87 & 88. [ISBN 0-07-709004-7]

Figure 4 6 Contexts of Change



1.5.2 The Contexts of Change in this Case

The strategic changes developed and implemented by the author can be traced back to mid 1988, when he was parachuted into the existing organisation of PCAP in Hong Kong as the Managing Director. He reported to the Corporate Headquarters in Boca Raton of Florida, the USA. This is Injection Change as described by Eccles. The Chief Executive Officer (CEO) of the Corporate, Computer Products Inc. was in fact also parachuted into the corporate three months before the author joined the Hong Kong organisation. This implied that the board of directors no longer had faith in the corporate's old top management. The new CEO had the backing of the board, and so was the author backed by the corporate headquarters. Typical of an injection change, the author was injected into PCAP fairly young (35 years of age), ambitious, and not wanting his career to stall there. The change was quite forceful, only second to a Take-over Change.

After the initial success, the changes that the author introduced to PCAP were of a kind of Renovation Change. The changes introduced from 1994 to 1996 can best be classified in this way. This could be difficult for the management of PCAP, particularly since the firm had been changed toward some success already. The difficulty the author faced was to agree a course of actions among the

management team and persuade the subordinates to alter their habits, view and work. This is demonstrated in Submission 4 and Submission 6 which reported respectively the changes in the process of technological innovation[18] and in renovating the information systems[19].

1.6 Agile Manufacturing Definition

W.B. Lee and S.Y. Ho[20] summarise the findings of the Iacocca study and define agile manufacturing as follows :

> *"..... manufacturers must have dynamic multi-venturing capabilities and be highly aware of technology trend so as to achieve leadership in manufacturing. Besides, there are skilful and knowledgeable employees working in teams to develop products with value services in short cycle times to satisfy customer needs."*

They list four characteristics of agile manufacturing : Product/Service Convergence, Virtual Organisation, Mass Customisation, and Agile Employees.

Goldman, Nagel and Preiss[21] define that for a company, to be agile is to be capable of operating profitably in a competitive environment of continually, and unpredictably, changing customer opportunities; and for an individual, to be agile is to be capable of contributing to the bottom line of a company that is constantly reorganising its human and technological resources in response to unpredictably changing customer opportunities.

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[18] Submission 4, *Beyond Technological Innovation - Delivering Value to our Customers.*

[19] Submission 6, *Renovating Information Systems to Achieve Competitive Advantage - Development of the Strategy.*

[20] Lee, W.B. & Ho, S.Y., *Agile Manufacturing - a Hong Kong Perspective*, a paper presented at the Global Manufacturing Research Group Annual Meeting, Cranfield University, U.K., July 8 - 10, 1996

[21] Goldman, S.; Nagel, R. & Preiss, K., *Agile Competitors and Virtual Organisation*, Van Nostrand Reinhold, 1995, [ISBN 0-442-01903-3]

They remark that agility is an umbrella term. It extends over a spectrum of correlated developments that together define a comprehensive change in the prevailing system of competition:

- At the level of marketing, agile competition is characterised by customer-enriching, individualised combinations of products and services.
- At the level of production, agile competition is characterised by the ability to manufacture goods and to produce services to customer order in arbitrary lot sizes.
- At the level of design, agile competition is characterised by a holistic methodology that integrates supplier relations, production processes, business processes, customer relations, and the product's use and eventual disposal.
- At the level of the organisation, agile competition is characterised by the ability to synthesise new, productive capabilities out of the necessary resources - the expertise of people and the physical facilities - regardless of their physical location within a company or among groups of co-operating companies.
- At the level of management, agile competition is characterised by a shift from the command and control philosophy of the modern industrial corporation to one of leadership, motivation, support, and trust.
- At the level of people, agile competition is characterised by the emergence of a knowledgeable, skilled, and innovative total work force as the ultimate differentiation of successful companies from unsuccessful ones.

The report[22] from the Iacocca Institute summarises the various characteristics of the agile enterprise in a table which is quoted herewith (Table 2).

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[22] Nagel, R. & Dove R. (Principal Investigators), *21st Century Manufacturing Enterprise Strategy*, Iacocca Institute, Lehigh University, 1991. [ISBN 0-9624866-3-9]

Table 2 COMPETITIVE LEADER 2006 - THE AGILE ENTERPRISE

COMPETITIVE FOUNDATION & CHARACTERISTICS	MANUFACTURING ENTERPRISE ELEMENTS	IMPLIED ENABLING SUB-SYSTEMS
☐ COMPETITIVE FOUNDATION ■ Continuous Change ■ Rapid Response ■ Evolving Quality Journey ■ Environmental Responsibility ☐ ENTERPRISE CHARACTERISTICS ■ Concurrency ■ Continuous Education ■ Customer Responsive ■ Dynamic Multi-Venturing ■ Employees Valued ■ Empowered Individuals in Teams ■ Environmentally Benign ■ Flexible (Re-) Configuration ■ Information Accessible & Used ■ Knowledgeable Employees ■ Open Architecture ■ Optimum First-Time Design ■ Quality Over Product Life ■ Short Cycle Time ■ Technology Leadership ■ Technology Sensitive ■ Total Enterprise Integration ■ Vision-Based Management	Business Environment Communication & Information Cooperation & Teaming Factors Enterprise Flexibility Enterprise-Wide Concurrency Environmental Enhancement Human Elements Subcontractor & Supplier Support Technology Deployment	■ Continuous Education ■ Customer Interactive Systems ■ Distributed Databases ■ Empowered Individuals & Teams ■ Energy Conservation ■ Enterprise Integration ■ Evolving Standards ■ Factory America Net ■ Global Broadband Network ■ Global Multi-Venturing ■ Groupware ■ Human-Technology Interface ■ Integration Methodology ■ Intelligent Control ■ Intelligent Sensors ■ Knowledge-Based Systems ■ Modular Reconfigurable Process Hardware ■ Organizational Practices ■ Performance Metrics & Benchmarks ■ Pre-Qualified Partnering ■ Rapid Cooperation Mechanisms ■ Representation Methods ■ Simulation & Modeling ■ Software Prototyping & Productivity ■ Streamlined Legal Role ■ Supportive Accounting Metrics ■ Technology Adaption & Transfer ■ Waste Management & Elimination ■ Zero-Accident Methodology

2. The Environment

2.1 A Micro View - The Company

Computer Products Asia-Pacific Limited, trading as Power Conversion Asia-Pacific (PCAP), was established in Hong Kong in 1981. The company is located in Shatin, occupying a 7-storey industrial complex with a total area of 140,000 square feet. In end 1996, the company employed about 800 employees in Hong Kong, plus another 1,300 in Zhongshan City in Southern China. Major products manufactured by PCAP are standard and custom AC/DC switching power supplies and DC/DC converters for applications in the computer, communication and industrial electronics markets world-wide. PCAP produces about 5 million units of power conversion products a year. These core electronics are the backbone of many industries that are vital to everyday life. PCAP is the Asia-Pacific regional headquarters of Computer Products, Inc. (CPI), a listed company based in Florida, USA and is specialised in the business of Power Conversion, Process Automation and Computer System.

The Power Conversion business is the largest among the three businesses of the Corporate. Computer Products/Power Conversion has over 20 years' experience in the design and manufacture of power supplies. Its major product lines consist of standard and custom AC/DC switching power supplies and DC/DC converters, over a wide range of input/output (I/O) voltages with power up to 1,500 watts. The Company was a pioneer in the development of the "switching power supply" and is again in the forefront of power conversion technology leading to a new generation of High Density Converters.

Annual sales of Power Conversion world-wide amounted to US$200 million in 1996. Readers who want to know more about the product strategy of the company may refer to Submission 4[23] and Submission 5[24].

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[23] Submission 4, *Beyond Technological Innovation - Delivering Value to our Customers*

[24] Submission 5, *Total Quality Management of the Supply Chain Logistics in Computer Products Asia-Pacific Ltd.*

The world-wide Power Conversion business organisation of Computer Products is divided into three divisions: Power Conversion North America (PCNA), Power Conversion Europe (PCE), and Power Conversion Asia-Pacific (PCAP). The plants are located in Boston, Massachusetts; Fremont, California; the Republic of Ireland; Hong Kong and China.

Most of the revenue of Power Conversion world-wide is supported by the products produced by PCAP. PCAP's manufacturing centre transferred products to PCNA, PCE and its own Asia-Pacific commercial sales centre. In 1996, the internal sales and external sales of PCAP amounted to almost US$100 million.

2.1.1 The Market Forces

PCAP ships products to the three most important continents in the world electronics markets – North America, Europe and Asia-Pacific.

Power Conversion North America (PCNA) is the largest internal customer of PCAP, contributing to 56% of the total transfer in 1996. It is further divided into PCNA Fremont and PCNA Boston. Power Conversion Europe (PCE) takes another 25%, and the remaining 19% goes to PCAP commercial sales in the Asia-Pacific countries.

The Asia-Pacific market is growing fast. PCAP is serving this market through its distributors and agents covering S. Korea, Japan, Taiwan, Hong Kong, PRC, Singapore, Malaysia and Australia. It also has a number of direct customer accounts. The major vertical market segments served by Computer Products world-wide are :-

- Computer and peripherals
- Telecommunication
- Data communication
- Industrial electronics

There are basically three sales channels to the customers at the end of the supply chain. They are distributors, sales representatives and national accounts.

Computer Products, through its twenty-eight years of business networking, has set up the strongest power supply distribution network in the USA and Europe. These distributors stock up the products and sell to customers who usually demand lower volume.

Sales representatives are usually on commission base. They help identify customer needs, conclude orders and provide after-sales service. They are middle-men between Computer Products and the second-tiers direct accounts.

National accounts are those major direct accounts whom Computer Products serves directly.

The market forces that PCAP faces are explained by the author in 1.3.2 using Tom Peters' Four Forces model, and also in 1.3.4 using Michael Porter's Five Basic Competitive Forces model.

2.1.2 The Problem - Why Do We Need SCM & Agility

If agility is the solution, what was the problem ? Goldman, Nagel and Preiss list ten marketplace forces that push companies for changes. The author sees that the problems PCAP faces fit into this list.[25]

1. Market fragmentation
2. Production to order in arbitrary lot sizes
3. Information capacity to treat masses of customers as individuals
4. Shrinking product lifetimes
5. Convergence of physical products and services
6. Global production networks

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[25] Goldman, S.; Nagel, R & Preiss, K., *Agile Competitors and Virtual Organization*, Van Nostrand Reinhold, 1995, p. 9. [ISBN 0-442-01903-3]

7. Simultaneous intercompany co-operation and competition
8. Distribution infrastructures for mass customization
9. Corporate reorganisation frenzy
10. Pressure to internalise prevailing social values

2.2 A Macro View - Development of HK/China Manufacturing Industries

In Submission 2, the author reviews the history of the development of manufacturing industries in Hong Kong.[26] The problems that Hong Kong faces in its industrial development and the solutions to such problems are discussed.

During the 1950s when the communist party took over Mainland China, a lot of industrialists, mainly from Shanghai moved to Hong Kong. That started the manufacturing industries of Hong Kong. By that time most of the manufacturing industries started were related to textiles and garment. In the 1960s when China was in turmoil, Hong Kong was relatively stable, though in 1967 there were riots which fortunately was settled. The plastic industry grew in Hong Kong around that time. Hong Kong was then lucky enough to survive the oil crisis in the 1970s. Its toy and electronics industries were nourished. In the 80s, the open-door policy of PRC gave a new direction to the Hong Kong manufacturing industries. While Hong Kong was facing increasing pressure due to inflation and rising costs, the Mainland provided ample land and labour at very attractive costs. That helped the manufacturing industries of Hong Kong to survive and remain competitive. In the 1990s, while the move of manufacturing to China continues, the industrialists in Hong Kong recognise that long-term survival of the industries cannot just rely on low-cost labour in China. The inflation in China causes costs to go up every year, and new competition is coming from other developing countries in Asia, including Thailand, Vietnam, etc. The processes and the products of the manufacturing industries in Hong Kong must be upgraded. The movement toward ISO9000 in Hong Kong is a good example of such intentional upgrade.

The author summarises the problem in the manufacturing industries in Hong Kong as[27] :

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[26] Submission 2, *Development of Manufacturing Industries in Hong Kong*

a.) Hong Kong's manufacturing sector generally performed less efficiently than certain parts of other service sectors.

b.) Because of relatively low productivity, manufacturers are unable to meet the level of wages offered by other services sectors.

c.) School-leavers prefer white-collar work and are not keen to join in manufacturing.

d.) Aging of workers.

e.) Rising of property costs.

f.) Growing competition in overseas markets.

g.) Inadequate research and development and a shortage of trained engineers.

h.) Trade dispute between China and the USA,

i.) A lack of long term industrial policy in spite of a more active Government support to the manufacturing industries in recent years.

He also summarises the solution to these problems, besides the move of labour intensive operations to China, as[28] :

a.) to automate as far as possible so as to be more productive and more flexible in response to changes ;

b.) to upgrade the products into higher value-added ones and to improve the process to meet market's demands for higher quality standards;

c.) to be more innovative and to promote more locally designed products;

d.) to be more technologically advanced and more skill-intensive;

e.) to speed up technology transfer by attracting more overseas investment with high-tech know-how;

f.) to set up education and training for more qualified practice-oriented manpower for industries.

The author's view on Hong Kong/China manufacturing strategy is in line with the model developed by Richard Yam[29]. Yam's hypothetical development model for Hong Kong/China manufacturing industries is quoted herewith in Figure 5.

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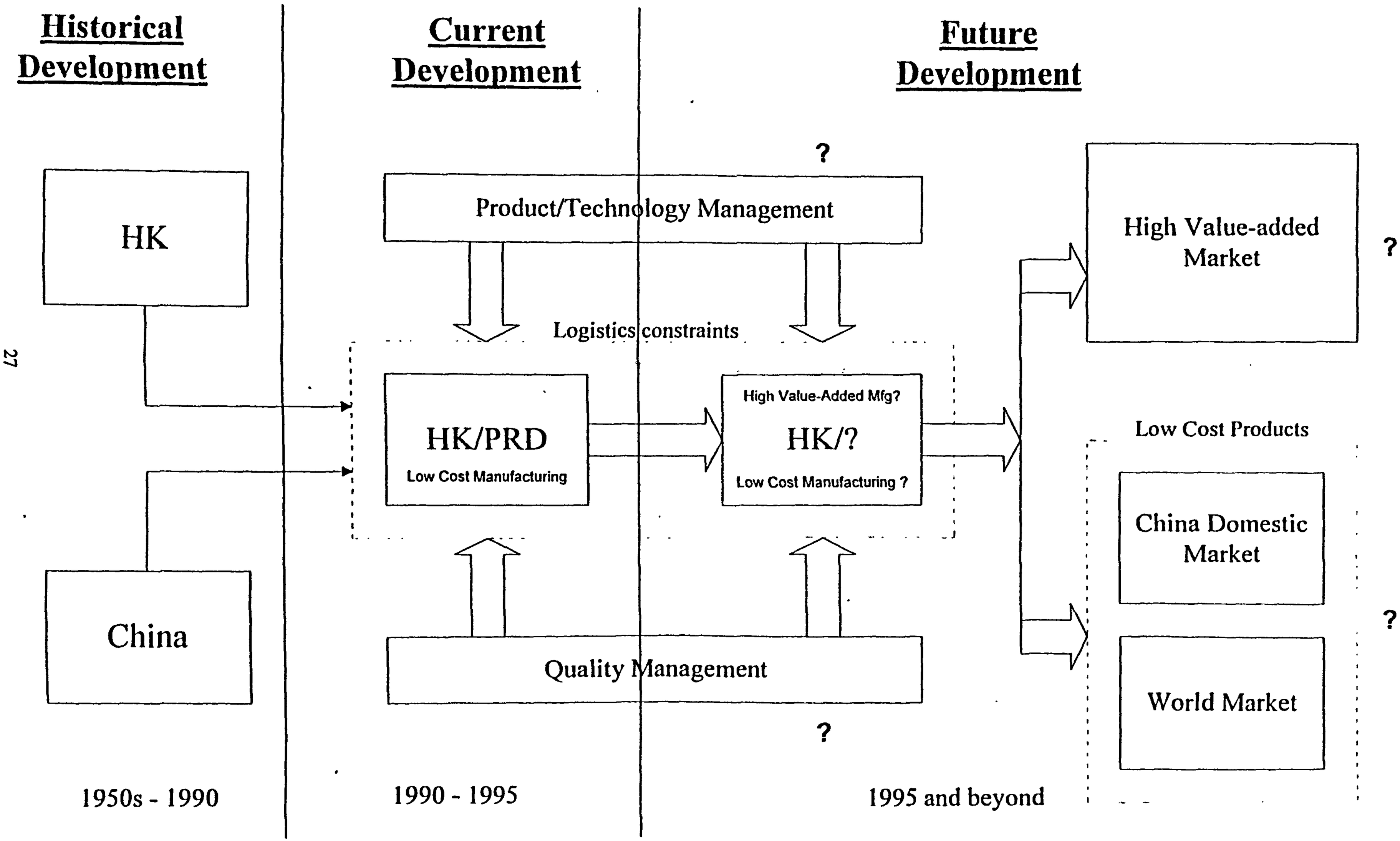
[27] Submission 2, *Development of Manufacturing Industries in Hong Kong*, p.6.

[28] Submission 2, *Development of Manufacturing Industries in Hong Kong*, p.7.

[29] Yam, R., *Strategic Development of HK/China Manufacturing Industries (Ph.D. thesis)*, University of Warwick, Engineering Dept., Warwick Manufacturing Group, 1996.

Figure 5 Hypothetical Development Model for HK/China Manufacturing Industries (Richard C.M. Yam)



3. The Model of Strategic Change Management

There are a lot of management papers on change management. Some focus on the people aspect of change management, and treat the issue of motivation as central[30]. Some focus on leadership and try to identify the attributes that managers in any organisation, at any level, can leverage to promote the process of change[31]. There is also research on the organisational structure aspects of change management. LeBarre[32] points out that in the rush to collapse vertical functional silos into horizontal planks of processes and to explore the organisational chart into empowered cross-functional teams, many have vaporised crucial connections, erected new boundaries, and left remaining workers confused and distressed. A fundamental change in the nature of relationships between people will be necessary to make a much more flexible, fluid and networked organisation. Nevertheless, though relatively "modern" management concepts such as reengineering are being tried out in the world, many have discovered the fundamental success factor is still the ability to "manage the change". Grover, Jeong, Kettinger and Teng[33] identified sixty-four Business Process Reengineering (BPR) problems. The severity of each problem was then rated by those who have participated in reengineering in 105 organisations. Analysis of the results clearly demonstrates the central importance of Change Management in BPR success. Resolutions of problems in other areas such as technological competence and project planning were also determined to be necessary, but not sufficient, conditions for reengineering success. This confirms the author's view on the fundamental importance of SCM to a business organisation.

It is interesting to note that a model of change management had actually been mentioned in "The Great Learning". It states that[34] :

> *"Things being investigated, knowledge became complete.*
> *Their knowledge being complete, their thoughts were sincere.*

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30 Anonymous, *Real people, real issues*, Business Europe, Vol: 35 Iss: 41, Oct 23, 1995.

31 Galpin, T., *Changing the change leader*, Employment Relations Today, Vol: 22 Iss; 3, 1995.

32 LeBarre, P., *The seamless enterprise*, Industry Week, Vol: 244 Iss: 12, 1995.

33 Grover, V.; Jeong, S.; Kettinger, W. & Teng, J., *The implementation of business process reengineering*, Journey of Management Information Systems, Vol: 12 Iss:1, 1995.

34 Legge, James, *The Chinese Classics Vol. I & II*, SMC Publishing Inc., Taipei, 1994, p.358,359. [ISBN 957-638-039-1]

Their thoughts being sincere, their hearts were then rectified.

Their hearts being rectified, their persons were cultivated.

Their persons being cultivated, their families were regulated.

Their families being regulated, their States were rightly governed.

Their States being rightly governed, the whole kingdom was made tranquil and happy."

The important message from the above is the concept that the change should start from investigation, and then the right motivation should be established. The influence starts from the ego, then spreads over the family, the states and the kingdom.

The model for Strategic Change Management developed and implemented by the author in PCAP is shown in Figure 6. This model covers the external factors from the environment and market in which the organisation is operating; the leadership from the top management especially in creating the culture of change; the implementation cycle of analysing, priority setting, organising, performance measurement and reward; followed by the reinforcement and next priority setting. In the importance of development of the right motivation (the culture of change), this is very much similar to the statement in "The Great Learning".

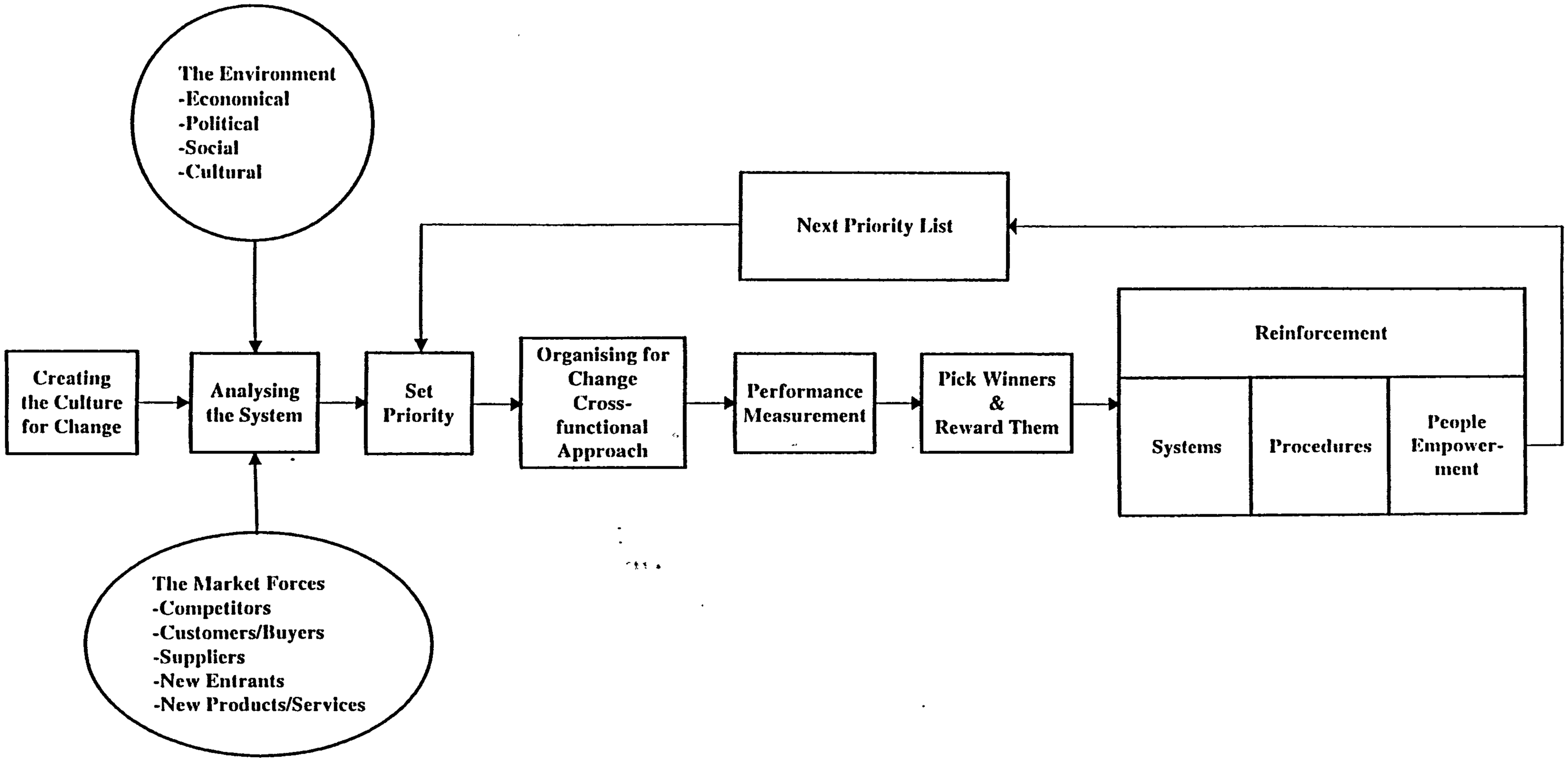
This model is very comprehensive. It differs from many other change management models (e.g., the Plan-Do-Check-Act cycle) in the way that this model is particularly applicable form top management of an organisation and covers all strategic aspect of the process of change.

The actual development and implementation of the various elements of the SCM Model in PCAP are reported in the other submissions. These submissions are referred to in sections 3.1 to 3.9.

3.1 The Environment and the Market Forces

These are reviewed in detail in sections 1.3.2, 1.3.4, 2.1 and 2.2.

Figure 6 Model for Strategic Change Management (W.K. Lo)



3.2 Creating the Culture for Change

When Computer Products, Inc. was, in 1988, looking for a managing director to head her HK$200 million manufacturing and sales unit in Hong Kong - Computer Product Asia-Pacific Ltd., she identified the author and persuaded him, to take up the challenge. In a short period of time, the Hong Kong business unit was turned around, and all areas of profitability, quality, cost, systems and morale were improved. The author's leadership quality and the demonstrated ability of the Hong Kong team under a strong leader convinced the corporate to agree to upgrade the Hong Kong unit as a sub-unit of the U.S. division to an independent Asia-Pacific division in 1989[35].

The effort that the author made to change and upgrade the operations of PCAP has resulted in a number of important awards. In May 1991, Computer Products Asia-Pacific Ltd. received the Excellence in Training Award from the Hong Kong Management Association. In July, it won the first ISO (International Organisation for Standardisation) 9001 Quality Management System Certificate issued by the Hong Kong government through the Hong Kong Quality Assurance Agency (HKQAA). In November, it won the Industry Department Quality Award of the 1991 Governor's Award for Industry, another great honour.

In December 1992, PCAP won both the **Productivity Award** and the **Quality Award** of the **Hong Kong Governor's Award for Industry.** It was the first time that a company won two grand prizes in the Hong Kong Governor's Award for Industry. In the same year the author was elected one of the **Ten Outstanding Young Persons,** and one of the winners of the **Young Industrialist Awards of Hong Kong.** The author is so far the only person to get all these honours in the same year.

In January 1993, BSI Quality Assurance granted an ISO 9001 certificate to the company. Encouraged by the success of its Hong Kong factory, PCAP pursued the implementation of ISO 9002 in its China factory in Zhongshan. In May 1993, the Zhongshan factory was

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[35] Submission 10, *Personal Profile*, p.2.

certified ISO 9002 by the HKQAA. This was the first ISO9000 certificate obtained by a factory in the Zhongshan city[36].

The author's experience in promoting quality shows that having the right company culture to encourage change is the key to successful TQM. As each individual has his or her own personality, each company has its own culture. A well-established company culture should be able to help absorb new ideas for continuous improvement. The company culture may have been there for a long time. The beliefs of the founding members and the top management team are developed into rules and systems, norms, style of management, and so on.

In order to rebuild the company culture in PCAP, the author decided that a common value - a stable and long-term mission had to be set up. This mission should be shared by the employees, whose participation and contribution were emphasised.

When PCAP progressed toward the end of the 1980s, the framework of its management system had been well established. There was a team of hardworking and dedicated employees. However, most of the employees were constrained by the system and hesitated to suggest changes.

In 1988, PCAP was at the cross-roads. In the United States, Computer Products, Inc. went through a major reorganisation, and its Hong Kong subsidiary did not seem to be able to cope with the new management style, and business was unsatisfactory.

In June 1988, as a new chief executive parachuted into the existing organisation in Hong Kong, the author saw the urgency to upgrade the company in order to meet the needs of the ever-changing electronics market. He firstly decided to develop a common vision among the employees. Immediately after he was on board, the author promoted the concept of "3C" (Figure 7).

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[36] Submission 1, *ISO9000, Foundation for TQM : A Hong Kong Experience in Achieving Operational Excellence through Evolutionary Changes,* p.5.

FIGURE 7

3C

3C作戰

1. CHALLENGE

2. CHANGE

3. CHARGE

COMPUTER PRODUCTS
POWER CONVERSION ASIA-PACIFIC

- Charge
- Change
- Challenge[37]

In order to achieve top-quality products and superior performance, employees were encouraged to "charge" themselves to acquire further knowledge and skills. They were expected to accept "challenge" with responsibility and courage, and to have the ability to manage "change" in order to improve.

"3C" was not just a slogan. In order to share the concept with all employees, the author organised in-house seminars, showing the slogan to all the staff and workers, and explaining the meaning of "3C" to them. To make it part of the company culture, employees visited other factories to see how they were managed. Experts were invited from outside to share their professional experience with the employees. A professional training manager was employed in 1988 to design and organise an integrated employee training and development programme. Such series of actions realised the commitment to "Charge".

Employees were encouraged to make suggestions for improvement and innovation. In the past, the design centres of power conversion products of the group were in the U.S. and Europe. The plant in Hong Kong was merely a manufacturing centre that followed the instructions provided by the design centres. Ideas for product improvement were raised only when there were serious manufacturing difficulties. Encouraged by the concept of "Challenge" and led by the author, the Hong Kong employees started to challenge themselves with a higher standard of product quality. Not only did they contribute to improvement of production methods, but they also initiated product design changes. PCAP demanded development of products with high manufacturability, high production yield, lower customer return rate, shorter cycle time, and lower production cost. In 1989, the Hong Kong plant was upgraded to a business division and Asia-Pacific headquarters. Following the direction of the author, the Hong Kong engineering team formed a

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[37] Submission 1, *ISO9000, Foundation for TQM : A Hong Kong Experience in Achieving Operational Excellence through Evolutionary Changes,* p.7.

"concurrent engineering" circle with their counterparts in the U.S. and Europe to develop products for the global power conversion market.

Concurrent engineering was used to improve the productivity and effectiveness of the product development process by means of a cross-functional approach, instead of the traditional sequential approach. As a result, production yield and customer return rate were improved, and the development cycle was shortened. PCAP employees were more confident. They were ready to face any challenge and to work out solutions.

The third concept, "Change", was also embraced by PCAP employees. They accepted continuous changes and improvement as a way of life. The award of the ISO 9001 certificate highlighted the importance of "Change" in the development of the new and complete quality management system.

To give the employees a clearer mission and vision of the Hong Kong company, the author introduced the "4M" slogan (Figure 8) at the end of 1988. Each M stands for a different centre :

- Manufacturing centre
- Materials centre
- Marketing centre
- Management centre[38]

It was explained to the employees that the first mission of PCAP was to manufacture good-quality, highly reliable, and cost-effective power supplies and converters to support the global business. Seeing Asia-Pacific as the world centre for electronic component sourcing, the second mission was to be a materials centre to support the operations world-wide. In and before 1988, the Hong Kong operation was just an offshore manufacturing factory for the U.S. division. PCAP management saw the opportunity in the up-and-coming high-end electronic market in Asia, and decided to promote marketing and sales in Asia-Pacific as the third mission. The fourth vision was to establish the Hong Kong

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[38] Submission 1, *ISO9000, Foundation for TQM : A Hong Kong Experience in Achieving Operational Excellence through Evolutionary Changes*, p.10.

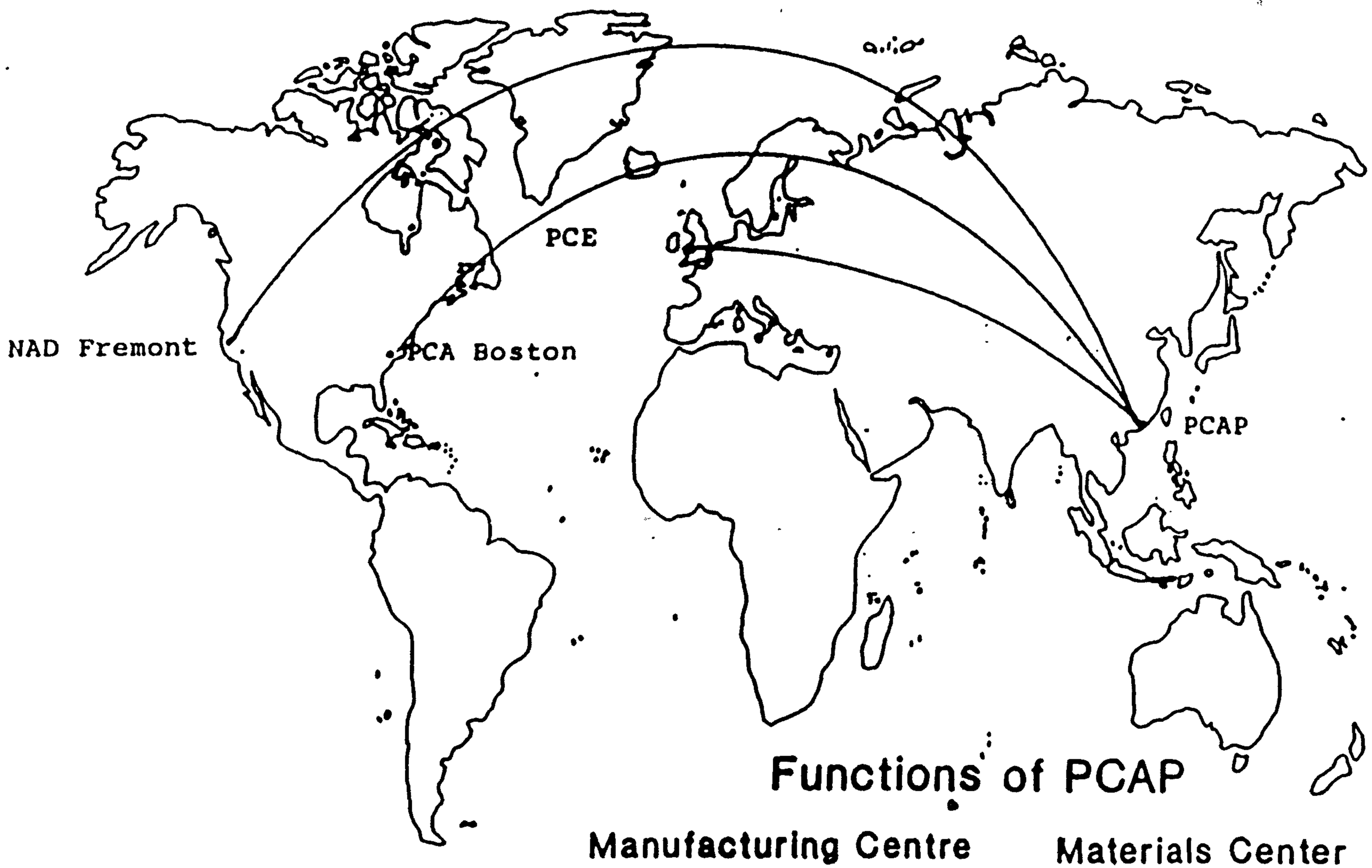
PCE
NAD Fremont
PCA Boston
PCAP
Functions of PCAP
Manufacturing Centre
Materials Center
Marketing Center
Management Center

FIGURE 8 4M

company as a management centre for new business opportunities in the fast-growing and ever-changing Asia-Pacific market.

The "4M" was shared with all PCAP Hong Kong employees. The author talked about this in the in-house seminars and promoted it through internal publications of PCAP. In 1989, the Hong Kong company was upgraded from an offshore manufacturing centre to an independent business division of Computer Products, Inc. and was named Power Conversion Asia-Pacific. This was a milestone toward the 4M. The achievement was attributed to top management's persistent and consistent view of the future. Since then, the 4M has been used as the slogan for the mission and vision of PCAP.

At the time of introducing the 4M slogan, PCAP was not involved much in product design. Since the early 90s, the author has expanded the design resources and capability of PCAP. The research and development team of PCAP is now established today. Besides the various standard and custom products developed, PCAP has also been granted two design patents.

3.3 Analysing the System

A successful change implementation cycle starts with a thorough analysis of the system to be changed. This is demonstrated in the submissions related to the implementation of ISO9000, the logistics improvement as well as the renovation on information systems.

In the first six weeks of the ISO 9001 programme of PCAP which started in the middle of 1990, the author directed the management team to work with the consultant to perform a detailed analysis of the existing quality system[39]. From the analysis, an improvement plan was constructed with a detailed schedule of tasks and manpower allocation. The first step of this project was to identify the scope of application for ISO 9001, which included the types of product or services, the affected departments, sections, and locations.

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[39] Submission 1, *ISO9000, Foundation for TQM : A Hong Kong Experience in Achieving Operational Excellence through Evolutionary Changes*, p.12.

During this stage, the author started to promote the spirit of ISO 9001 among top and middle management, to help them understand the role of every employee and every department in the ISO 9001 system. A cross-functional task force was set up with representatives from all departments. The chairman was the Quality System Manager (the Quality Manager) who reported directly to the author. No additional staff were hired for the ISO 9001 programme.

Another example is the analysis process in the project to improve the supply chain logistics[40]. To facilitate the analysis, a Time Based Process Map (TBPM) outlining the major activities in the Inbound, Internal, and Outbound Logistics is used by the author. A simplified TBPM (Figure 9) is attached for demonstration. In the actual system in PCAP, materials lead-time varies greatly from one type of component to the other. Also, time for outbound logistic changes with the ship-mode (air, sea, sea-air) and the location of the customer. However, it can still be seen easily from this simplified TBPM that most of the time spent is non value added. A lot of time is spent on the materials lead-time, and on queuing in the warehouse. Transit time is another major factor that lengthens the total time of the supply chain.

The product development and design process is not included in the TBPM. Depending on the complexity of the product, and whether that be a standard product, modified standard, or a custom, the design cycle lead-time can be from several weeks to several months, or even over one year. This will certainly add time to the total business cycle.

The TBPM reveals potentials for improvement in the supply chain logistics of PCAP. Such opportunities lie in areas of inventory management, information system, distribution system and product management.

In 1994, during the study on the opportunity for system information improvement, an Information Audit[41] was carried out by the author to assess the quality of information of

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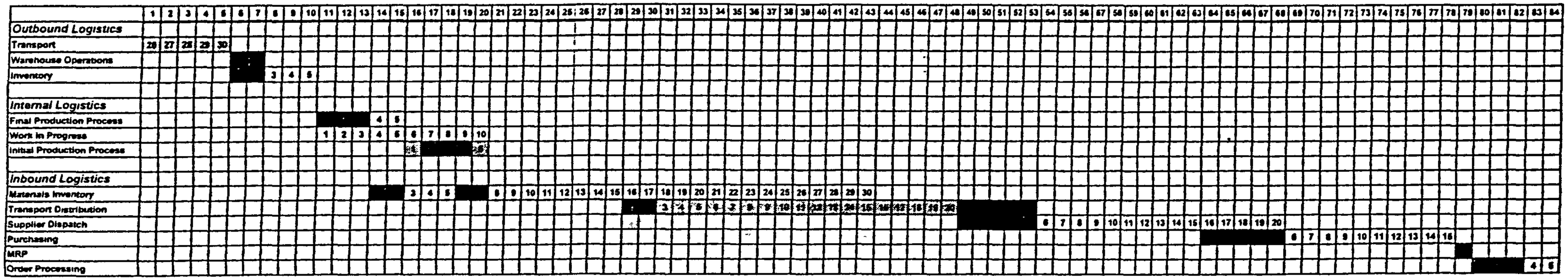
[40] Submission 5, *Total Quality Management of the Supply Chain Logistics in Computer Products Asia-Pacific Ltd.*, p.15.

[41] Submission 6, *Renovating Information Systems to Achieve Competitive Advantage - Development of the Strategy*, p.18.

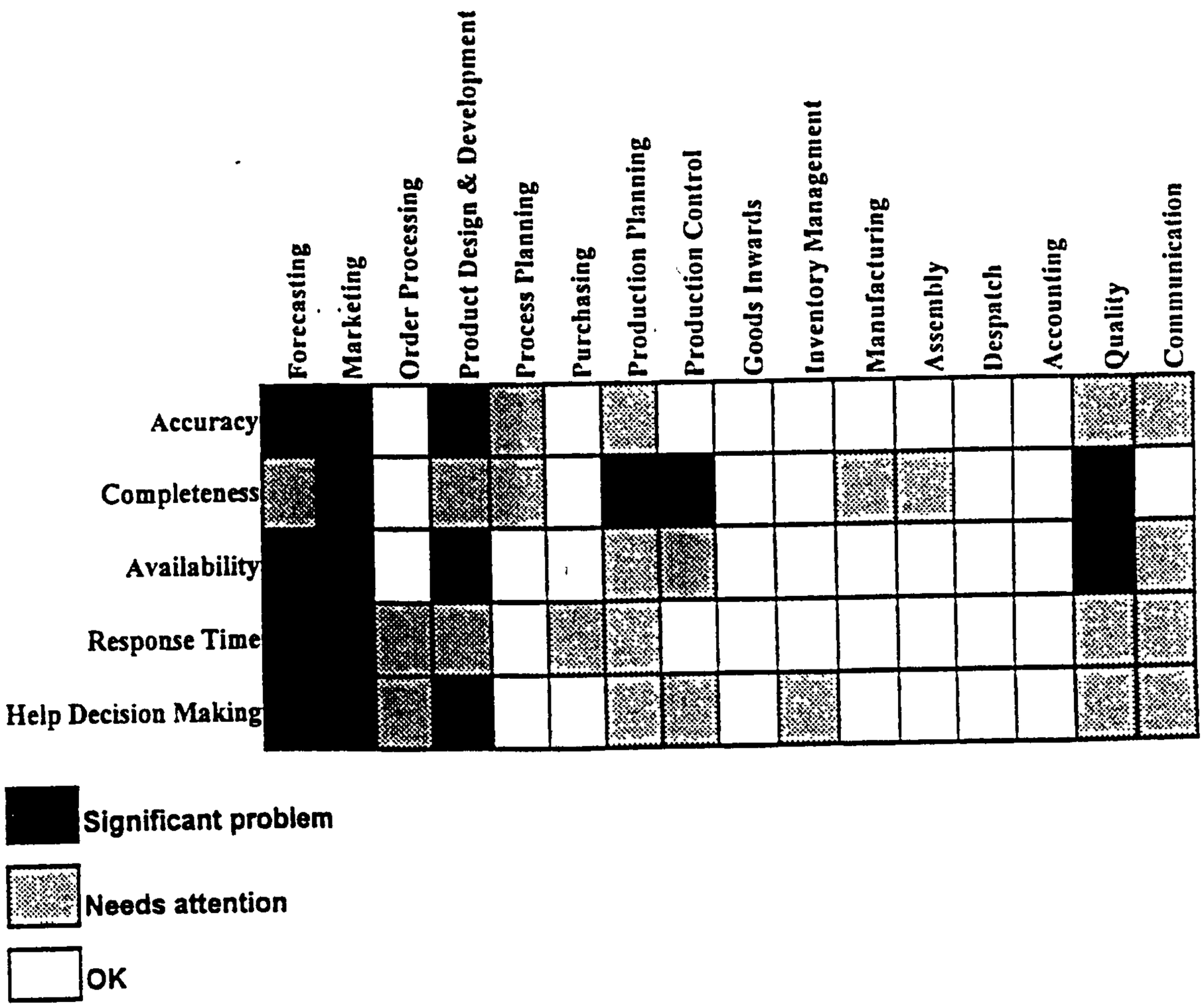
Figure 9 Time Based Process Mapping

Value and Non-Value Added Time



the present systems across the dimensions of accuracy, completeness, availability, response time, and the degree that helped decision making. The assessment was made across all the key functional activities. The result shown below (Figure 10) gives a picture of overall information provision. The key problem areas are highlighted.

Figure 10 Information Audit



The areas in which more problems and opportunities existed were Forecasting, Marketing, Product Design & Development, and Quality. Improvement was needed in some other areas but the information audit reflected the fact that support to the front end of the business was weak in the systems.

A System Audit Grid analysis[42] (Figure 11) was conducted by the author to assess the business and technical values of existing systems.

Figure 11 System Audit Grid Analysis

Business Value	Technical Quality: Low	Technical Quality: High
Low	**Divest** Spreadsheet Wordprocessor Payroll Employee Data Office Automation	**Reassess**
High	**Renew** MRP II Hardware (HP3000-70) Common Engineering Database Computer Aided Engineering (CAE) Computer Aided Testing (CAT) Computer Aided Quality Management (CAQM)	**Maintain and Enhance** MRP II Software (ASK MANMAN) E-mail & Voice-mail Finance package (Hyperion)

The above analysis helped identify the systems that need to be renewed and also systems that need to be maintained and enhanced. There was no system that needed to be divested because any such system had already been divested.

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[42] Submission 6, *Renovating Information Systems to Achieve Competitive Advantage - Development of the Strategy*, p.19.

3.4 Set Priority

An important role of the leader in the SCM process is to set priority.

When he was parachuted to PCAP in 1988, the author saw that his priority was to rectify the problems in the operations in the factory, so that the business of the whole Power Conversion Group could be well supported in order to bring the Corporate back to profitability. In 1990 when he saw the operations of PCAP was on the right track, he decided to go for ISO9000 certification in order to strengthen the foundation for continuous improvement. These are examples of priority setting for the chief executive.

3.5 Organising for Change - the Cross-functional Approach

To overcome the conflict between the cross-functional changes needed and the hierarchical structure of PCAP, the author has used very substantially the cross-functional task forces approach.

It is a management axiom that crabgrass grows in the cracks between departments. For example, purchasing buys parts cheap, but engineering wants them to be high grade, and manufacturing needs them strong. Shipping moves goods in bulk, but sales promises the customers fast delivery. A cross-functional dispute where nobody has total control over the whole process will adversely affect the company operation and the level of service to the customers.

Cross-functional teams are formed to consider the overall optimisation rather than suboptimisation. Traditional manufacturing departments tend to be measured on unit costs, an intradepartmental number that can lead to excessive production runs and stacks of unsold goods. By contrast, an integrated manufacturing-shipping process might be rated by how often it turns over its inventory - a processwide measurement that reveals how all are working together to keep costs down. People with different skills are grouped to accomplish a complete piece of work simultaneously, not in series. Information moves straight to where it is needed, unfiltered by a hierarchy.

In 1988, having established the 3Cs, the author started to use cross-departmental task forces to tackle specific operations issues. Different process management teams were formed with team members from related departments. In the initial stage, four working teams were formed by the author :

1. Asset management
2. Cost reduction
3. SIOP (sales, inventory, and operations planning)
4. Quality improvement[43]

The author also formed a steering committee to oversee the running of these teams. Every month the team leaders reported their progress to the steering committee of which the author was the chairman.

The task forces were very successful, and consequently the same organisational approach was used in the ISO 9001 project of PCAP. The scope of ISO 9001 covered all the functional departments within the organisation. Therefore, it was a natural choice to use the cross-functional team approach.

Cross-functional approach is also used at divisional level. Over the years, a number of cross functional and cross divisional councils have been established within CPI, e.g., the Marketing, Engineering, Operations, Quality & Technology Councils. These councils are chaired by executive management while communications are linked and constantly promoted by joint council meetings. The Marketing, Engineering and Operations Councils are chaired respectively by each of the divisional chief executives who report to the Chief Executive Officer (CEO) to ensure they are synchronised[44]. The author is the chairman of the Operations Council.

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[43] Submission 1, *ISO9000, Foundation for TQM : A Hong Kong Experience in Achieving Operational Excellence through Evolutionary Changes*, p.11.

[44] Submission 4, *Beyond Technological Innovation - Delivering Value to our Customers*, p.6 & 7.

In terms of Product Development activities, the Marketing Council is an enlightened body monitoring on-time delivery of new products to the market. The emphasis on the need to tie Technology Development programmes to products, and to allocate resources to longer term technology needs before satisfying short term product needs is important. The Engineering Council is responsible for the development of the programmes according to the product roadmap agreed by the Marketing Council. The Technology Council is a cross functional and cross divisional team to drive the Technology Platform Development Process necessary for the roadmap identified. The Operations and Engineering Councils are implementation parties to turn the technology platform developed into saleable products.

There is an "internal customer" chained relationship amongst these councils where orders are constantly generated by the Marketing Council onto the Engineering Council. The Engineering Council deploys the marketing requirements and generates requirements for the Technology Council. The Operations Council, under the chairmanship of the author, ensures the programme is well managed under PACE (Product And Cycle-time Excellence), a programme Computer Products uses to manage the product development cycle.

The PACE is a cross-functional and a concurrent engineering process[45]. It was developed by a consultant firm called PRTM. It's success depends not just on the procedure but also on the organisation. In Computer Products, PAC (Product Approval Committee) teams are formed with representatives from all departments concerned - marketing, product engineering, quality, manufacturing, and procurement. PAC teams are the management bodies of PACE to give directions and empower their PACE Core Teams (Figure 12).

PACE Core Teams are the functional bodies of PACE which are formed for each new model being developed. There are two types of PACE Core Team - Design Core Team and Design Transfer Core Team. Design Core Team is in the original PACE model developed by PRTM. The Design Transfer Core Team concept is an enhancement that

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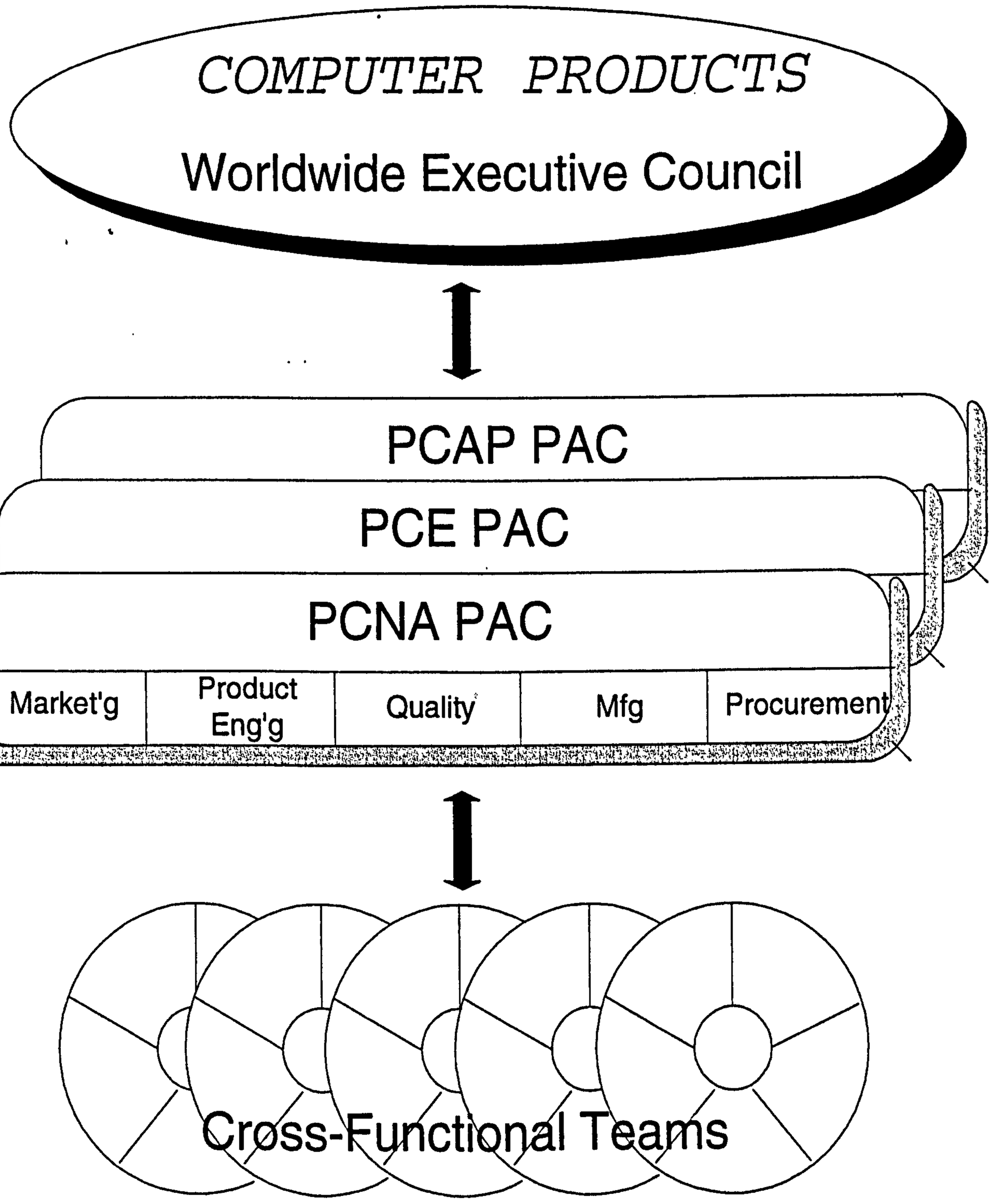
[45] Submission 4, *Beyond Technological Innovation - Delivering Value to our Customers,* P.16 & 17.

Figure 12 CPI PACE Structure



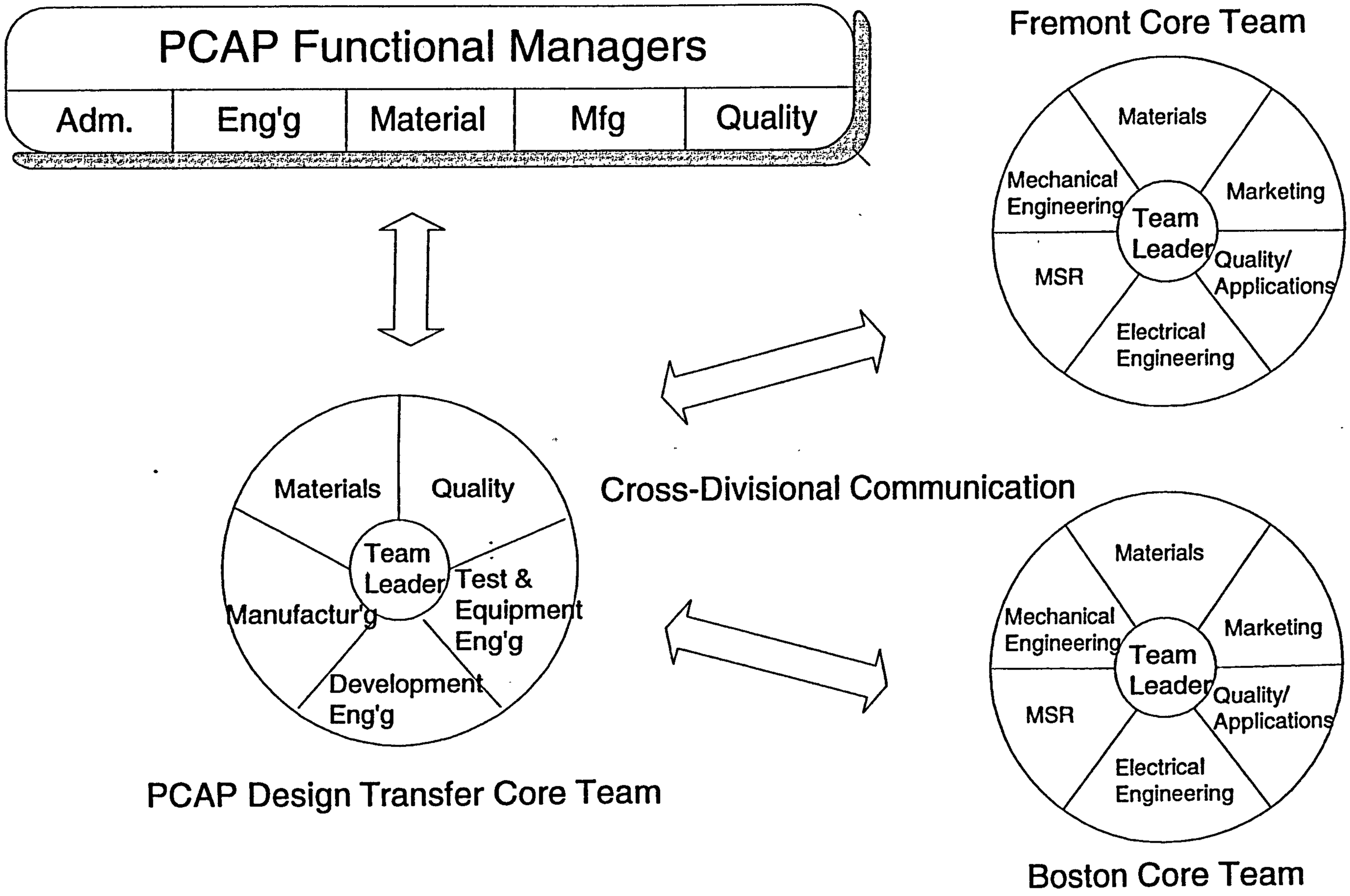
the author advocated and implemented to make PACE workable in a multi-location operation such as in the case of PCAP and its sister divisions. Members of Design Core Teams come from different functional departments of the design location - marketing, quality, electronics engineering, mechanical engineering, materials, plus MSR (Manufacturing Site Representative) from the manufacturing location; whereas members of the Design Transfer Core Team come from manufacturing, materials, quality, test & equipment engineering, and development engineering from the manufacturing location. Members of each core team are responsible for expediting the new model development on their respective functional areas. In order to meet the targets of the business plan, they also need to report to PAC for any difficulties which may affect the planned targets. MSR in the Design Core Team comes from manufacturing site. He/She is empowered to speak for the manufacturing site. During the product development process, cross-divisional communication is carried out among PAC, MSR, Design Core Team and Design Transfer Core Team (Figure 13).

3.6 Performance Measurement

Although there are numerical goals in the PCAP business plan and budget, and also in the individual MBO (Management by Objective) targets, they are neither superficial nor superfluous. At the beginning of every fiscal year, the author sets MBO targets for each of his direct reports. The PCAP management team is conscious that these goals have to be drivers which make the business grow profitably and healthily, and improve the products and services to the customers. It is essential that every goal is supported by solid actions.

PCAP positions itself as a market-driven company. Each year the management team plans ahead, using its annual business plan and its 3-year strategic plan. At the beginning of the year, each department reviews its past year's performance and sets up new targets for the coming year. After integrating other sources of information, such as internal process capabilities, supplier's input, marketing trends, technological breakthrough, and human resources, the business plan is finalised. The 3-year strategic planning cycle is developed when the annual business plan is completed.

Figure 13 PACE for Products Designed in USA & Manufactured in PCAP



PCAP's senior managers meet regularly with their key customers to gather their feedback on the services and products, their future needs, and what they expect of PCAP. Within the company, there is a joint task force working on value engineering. Market information collected by salesmen, distributors, and agents is digested by the value engineering work team. The results of the value analysis will be used as milestones to set up the new target costs, new features, forms, fits, and functions for the next generation of products.

In order to review the progress, the management use a monthly operation report system to evaluate the performance against the specified goals.

For example, some of the short-term plans for 1995 included :

- Asia-Pacific sales increase by 90%
- Continuous cost reduction of 7% a year
- on-time delivery
- Less than 300PPM defects on outgoing goods

These short-term plans are supported by seven long-term movements.

- Just-in-time implementation
- Flexible manufacturing capacity
- Sales and inventory operation planning activity
- DOE (design of experiments) technique application
- Vendor management
- Testing facilities upgrade
- World-class training

The numerical goals are derived from careful consideration by the whole management team. They are important business drivers. The author's thinking is in-line with Deming on this topic[46].

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[46] Submission 3, *Application of Deming's Principles in the Management of Change - A Hong Kong Experience,* p.16 & 17.

3.7 Pick Winners and Reward Them

Besides the salary review which has a direct impact on the monetary reward for performers, various award programmes have been introduced by the whole group to encourage good performance, both for the individual and for the teams.

- Outstanding Achievement Award - this is for individuals who have been consistently demonstrating outstanding performance. Usually, two to four winners are elected in a year. Besides a memento plate issued by the corporate, each awardee will also get a cheque equalling 5% of his/her annual package.

- Team Award - this is awarded to cross-functional teams which have demonstrated outstanding performance. Again mementoes from corporate will be presented to each of the winning team members, and monetary award will be given.

- Night-in-the-Town Award - this is for individuals who have special contribution to specific projects, or some accomplishment which may not be qualified for an Outstanding Achievement Award. The award is a cheque of HK$1,000.

Besides the above, a Patent Award Programme has been introduced since 1995. Computer Products values intellectual property such as patents and encourages employees to utilise their creativity to conceive new inventions and discoveries that will enhance and add value to the products or processes, and eventually to the customers . Accordingly, the Company has authorised a Patent Award Programme to recognise inventors who succeed in obtaining patents.

Computer Products has made policies to help inventors follow steps that will protect their own and the Company's legal rights. The Company will provide help throughout this process. All costs and fees needed in obtaining, issuing, maintaining and protecting the patent will be paid by the Company. Patent Representatives are assigned in each division to help decide if an idea is patentable, to ensure that all aspects of the patent and intellectual property policies are followed, to watch for and bring patentable ideas to the attention of management, to provide assistance for those inventors to begin the patent

process, and to enter the inventors in the Patent Award Programme. Steps are there for all qualified inventors to apply for the Patent Award. Legal fees and charges for the patent search, the patent application and the patent filing will be paid by Computer Products, Inc. with the approval of the V.P. of Technology[47].

For department head level, an Executive Incentive Plan is established which relates annual bonus of each participant to the group performance, the divisional performance and individual objectives. Based on the recommendation by the author, stock options are offered to all managers which links a special reward to each of the managers to the stock price performance of the whole corporate.

3.8 Reinforcement - System and Procedures, People Empowerment

The implementation of ISO9000 is a good example of how the author reinforces improvement by formalising good practice into the system and procedures.

Some people may see ISO 9000 as a bureaucratic and expensive procedure that has to be followed in order to export products to the advanced countries. The author's experience in implementing ISO 9000 shows that such a view is not true. ISO 9000 is perceived as a tool that helps improve the PCAP quality system. It is true that there is increasing pressure from the market for manufacturers to adopt ISO 9000, particularly in industries like electronics, computers, and toys. Such demands were initiated in Europe, and now customers in Europe, North America, and Asia are asking their vendors to adopt ISO 9000. ISO 9000 has become part of the external requirement for a company to satisfy its customers; it is also a tool the company can apply to improve its quality system and speed up the progress toward TQM[48].

Another means to reinforce improvement is the "corrective action" procedure. Following the direction of the author, PCAP has established well documented corrective action procedures which incorporate the following elements :

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47 Submission 4, *Beyond Technological Innovation - Delivering Value to our Customers*, p.8 & 9.

48 Submission 1, *ISO9000, Foundation for TQM : A Hong Kong Experience in Achieving Operational Excellence through Evolutionary Changes*, p.14.

- Formal investigation of the cause of non-conformity.
- Comprehensive analysis of possible contributory factors.
- Recommendation of realistic corrective actions to deal with the problems.
- Formal review of corrective action, after a suitable period, to verify implementation effectiveness.
- Recording and implementation of changes in procedures resulting from corrective action.

Corrective action reviews are performed by suitable personnel and verified regularly by internal auditors.

A formal review of corrective actions is generally performed by the functional head(s). The results, if significant, are submitted to the quality management review meeting via the Quality System Manager for re-examination[49].

The author and the management team of PCAP believe that everyone involved in its products and services must understand the customers' requirements and be trained so that he/she understands the standard required and how he/she may achieve that standard.

The author has set a policy in PCAP that the people employed must have appropriate experience or qualifications for the tasks they are required to perform. The Human Resources Manager is responsible for the operation of this policy. He ensures that training records are updated.

Departmental managers are responsible for the training of the members of their respective departments. For example, the Quality and Manufacturing Managers are responsible for the training of their inspectors and auditors in the use of the quality system, testing procedures and working instructions. The Manufacturing Manager further ensures that the shop floor operators are aware of the requirements of the quality system applied to them.

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[49] Submission 3, *Application of Deming's Principles in the Management of Change - A Hong Kong Experience,* p.11.

The Human Resources Manager, in conjunction with other senior managers, identifies the training needs of all personnel and ensures that the policy of continual development of people is adhered to.

For instance, all newly recruited operators have to attend a two or three-day full-time training in the in-house training room. Besides providing basic orientation to the new operators, the training supervisor teaches them how to:

- recognise various electrical components;
- understand the company's policy on Quality, SPC (Statistical Process Control), Industrial Safety & ESD (Electro Static Discharge) Precaution;
- understand PCAP's workmanship standards; and
- apply total quality management concept in their work.

Such basic training is an essential investment, since an untrained operator on an assembly line would possibly make a lot of expensive mistakes.

In line with the company's commitment to high quality standards, there are several specialised skills training workshops for critical operations such as incoming quality control inspection and testing operations. Only workers who have successfully read and passed these internal courses are allowed to take up the corresponding jobs[50].

3.9 Set Next Priority List, Start Next Cycle of Change

It is important that top management continuously drive the organisation to the next level of excellence, based on the success that is enjoyed in the implementation of a change. In PCAP, such process of setting new objectives is formalised in the annual business plan and the 3-year strategic plan.

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[50] Submission 3, *Application of Deming's Principles in the Management of Change - A Hong Kong Experience*, p. 11 & 12.

At the beginning of the year, each department reviews its past year's performance and sets up new targets for the coming year. After integrating other sources of information, such as internal process capabilities, supplier's input, marketing trends, technological breakthrough and human resources, the business plan is finalised. The three-year strategic planning cycle is developed when the annual business plan is completed.

Key customers are met regularly to gather their feedback, their future needs, and what they expect of PCAP. Within the company, there is a joint task force working on value engineering. Market information collected by the salesmen, distributors, and agents is digested by the value engineering work team. The results of the value analysis will then be used as milestones to set up the new target costs, new features, forms, fits, and functions for the next generation of products.

In order to review the progress, a monthly operation report system is used to evaluate the performance against the specified goals. For example, among 1993 short-term plans, four stood out :

1. Increase Asia-Pacific sales by 60%
2. Continuous cost reduction of 10% a year
3. 95% on-time delivery
4. Less than 500PPM defects on outgoing goods

These short-term plans were supported by seven long-term movements :

1. Just-in-time implementation
2. Flexible manufacturing capacity
3. Sales and inventory operation planning activity
4. DOE (design of experiments) technique application
5. Vendor management
6. Testing facilities upgrade
7. World-class training

Individual departments are committed to long-term movements, and the progress is reported and reviewed monthly. There were 11 major achievements from 1989 to 1993:

1. Added values improved.
2. Inventory turns (annualised cost of sales divided by the average inventory level) increased from 6 to 10.
3. Throughput time reduced.
4. The average order lead time decreased from 12 weeks to 4 weeks.
5. The scrap rate reduced from 0.25% of sales to 0.1% of sales.
6. Each year, more than 5% cost reduction on products was maintained.
7. The labour efficiency was kept improving even though the routing hour (the standard time to produce a product) reduced by 4% per year on the average.
8. The overall test yield improved from 92% to 98%.
9. The warranty return rate dropped from 1.2% to 0.2%.
10. The outgoing audits defect rate dropped from 5,000 ppm to 500 ppm.
11. The repair backlog dropped from 1800 sets to 38 sets.

About a year after PCAP obtained its ISO9001 certification for its Hong Kong factory in July 1, the author planned for certification of his Zhongshan factory. The Zhongshan factory was certified in May 1993. The project to upgrade the systems to the 1994 standard was then introduced by the author in 1995. Also 1994 saw the year of beginning of the information systems renovation in PCAP. A study on Design of Electronic Products for Mass Customization[51], a joint project with the Hong Kong University of Science and Technology was kicked off by the author in 1996. These are cycles of changes which have been conscientiously introduced by the author in order to bring PCAP to the next level of excellence.

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[51] Submission 9, *Design of Electronic Products for Mass Customization*

4. Transformation Toward Agility Through Strategic Change Management

The author's strategic change management has led PCAP through various stages of excellence toward agility. To verify the perception of the employees of PCAP during such period of changes, the relation among the satisfaction of the staff of PCAP, the excellence factors, and the elements of agility is studied using an empirical method[52]. The results of such factorial and correlation study are discussed in Submission 8 and a brief review is presented in section 5.4 of this Executive Summary.

The major result of the strategic change management in PCAP can be summarised as a transformation toward agility. Such transformation is diagrammatically illustrated in Figure 14. The Strategic Change Management process transformed the Generic Value Chain of the organisation into what the author called "Agility Chain".

The achievements in various aspects of the business of PCAP are discussed below.

4.1 Created Competitive Advantages through TQM

During the first two years (from 1988 to 1990) when the author was parachuted to PCAP as the leader, he saw that the priority to enable the company to survive was to improve its manufacturing operations. To achieve this, the author believed the most effective tool was to promote Total Quality Management (TQM) in the company. The very important first step in this movement was to create a culture of change. The author was able to achieve this through the promotion of the "3C" and the "4M". This is explained in section 3.2.

Solid actions were implemented by the author to improve asset management, cost reduction, excess and obsolescence management, and also to improve in process quality yield. The fruitful results of these actions helped the bottom line of the business, and PCAP was able to break-even in the second half of 1988, despite the negative financial

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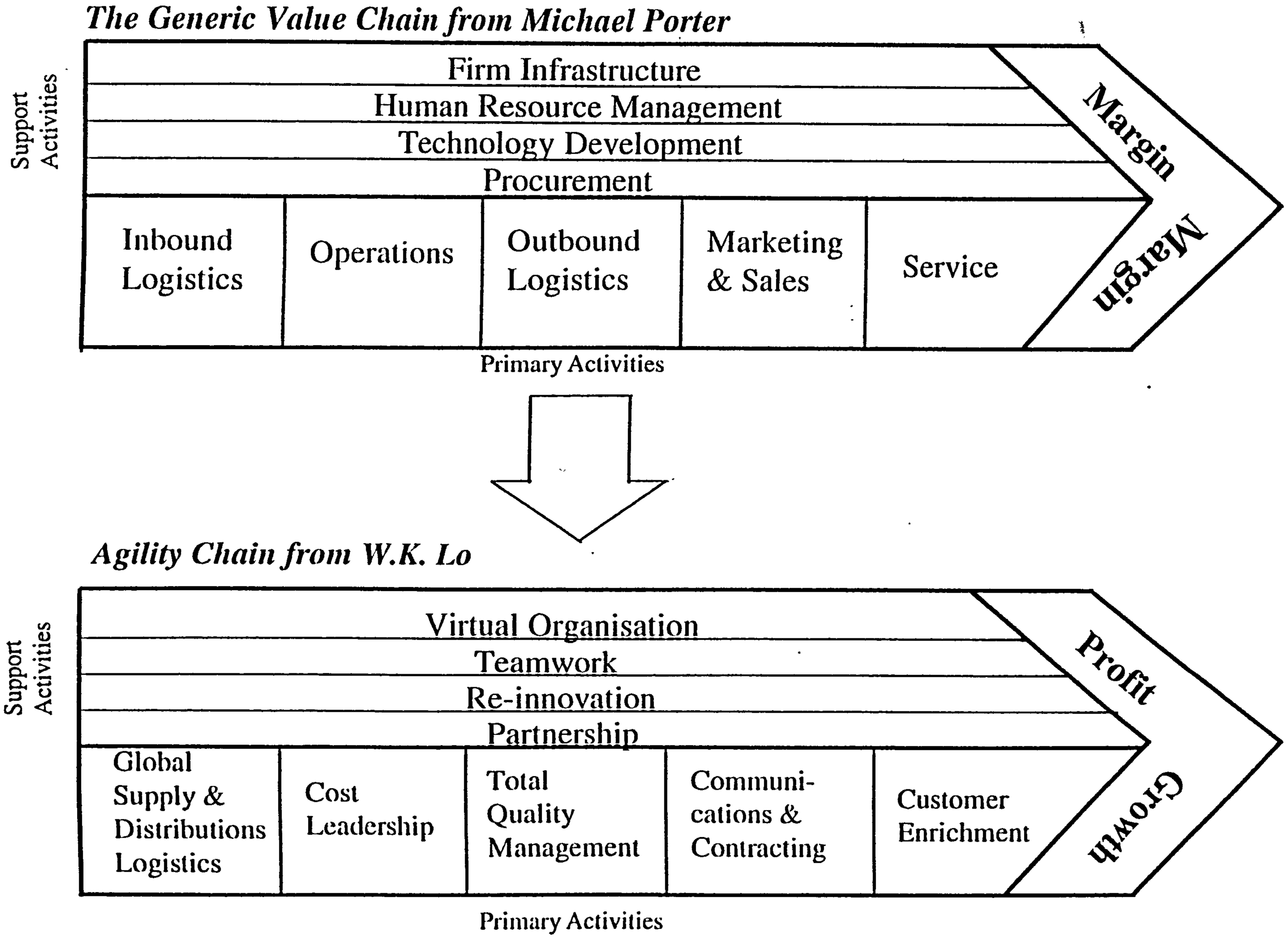
[52] Submission 8, *An Empirical Study of Employee Job Satisfaction, Organisation Excellence and Agility - Their Factor Structures and Correlations*

Figure 14 Transformation from Generic Value Chain to Agility Chain



performance in the first half. This demonstrated how rapidly the operation could be improved when the right priority was set up and the proper corrective actions were taken. Under the leadership of the author, the performance of PCAP continued to improve in 1989, and this resulted in the agreement from the Corporate to upgrade the HK operations to the Power Conversion Asia-Pacific division in the later part of the year. The ability to turn around the business earned the author trust from the U.S. corporate office, as reflected in the following comment :

> *"PCAP, which was in a dangerously deteriorating spiral in the early part of 1988, has had an excellent 1989, both in terms of operational and financial performance, confirming the effectiveness of new leadership and new structures."*

Encouraged by the result and also seeing the need to build up a strong foundation so that the improvement could continue, in the middle of 1990, the author decided to apply for ISO9001 certification for the Hong Kong plant. A detailed description of the process of designing, implementing and applying for ISO9001 was given in Submission 1[53]. It was a successful story that the full certificate was completed in July 1991, 12 months since the beginning of the project. As the first company in Hong Kong certified ISO9001 by the Hong Kong Quality Assurance Agency, PCAP's reputation in the industry was greatly enhanced. As reported in Submission 1, the overall factory loading increased by 50% in 1992, one year after the Hong Kong plant received its ISO9001 certificate. The sales to Asia-Pacific customers also increased by 52% in 1992. Though ISO9000 was not the only reason for such growth, it was certainly a key contributor.

Various figures demonstrating the improvement in operations of PCAP from 1989 to 1993 were reported in section 3.9. These figures reflected solid improvement of competitive advantages of PCAP because the operations improvement directly impacted PCAP's ability to serve the customers. PCAP was able to show to the customers its

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[53] Submission 1, *ISO9000, Foundation for TQM : A Hong Kong Experience in Achieving Operational Excellence through Evolutionary Changes*

flexibility to build quality power supplies at whatever quantity, with the cost continuing to reduce.

4.2 Built up Strong Cross-departmental and Cross-divisional Teamwork

As described in section 3.5, the author used very substantially cross-functional approach in tackling business issues. He did not only practise that in PCAP but also promoted the use of such approach in cross-divisional issues.

A key element in agile manufacturing is Virtual Organisation. The author believes that in a manufacturing factory, a certain hierarchical structure is needed. The short-comings of such a structure can be resolved by means of cross-functional task forces. He demonstrated this concept in PCAP. Such a concept was applied in major cross-divisional councils that deal with strategic decisions, as demonstrated by the formation of the Marketing Council, Engineering Council and Operations Council in CPI.

Strong teamwork was built in PCAP and among sister divisions through such cross-functional activities. When CPI was in the process of recruiting a new president for its U.S. Power Conversion Division in the second half of 1990, the author was assigned to temporarily oversee the administration and operation of the U.S. division on top of PCAP. This proved the author's ability in team building even cross-divisionally, and the Corporate's trust in him as a result of his professionalism and leadership.

4.3 Established Cost Leadership Position

Cost reduction is a major element in the improvement programme in PCAP. In the business plan of PCAP, the author enforced action plan for cost reduction is a must for every department. Major areas for cost reduction include

- Materials cost reduction - this is achieved through purchase price negotiation with vendors, development of new sources, and consolidation of component part numbers.

- Labour cost reduction - this is reflected in the percentage of labour productivity improvement. Such improvement is achieved through automation, process improvement, time study, and transfer of labour intensive operations to the China plant in the city of Zhongshan.

- Overhead reduction - this covers all overhead areas like utilities, freight and transportation, staff cost, etc. with detailed action plans.

Cost reduction is a continuous process. The author manages that in PCAP as a Kaisen process. All employees are educated about the importance of cost reduction, and this is reported and measured in the monthly operations report and is part of the MBO's of all managers.

Through such ongoing cost reduction activities, PCAP was able to help the whole Power Conversion business world-wide to maintain a mid-thirty gross margin percent. This is higher than most of the competitors world-wide.

4.4 Penetrated the Right Vertical Market Segments

The power supply market is very fragmented. There are many competitors in the world. On the other hand, applications of power supply are so wide that market opportunities are there in almost every vertical market segment. Simply speaking, all electronic devices need a power supply of some kind. In order to grow and maintain the profitability, one must be able to identify the right vertical market segment to be served.

In the mid 90s, the author, together with his counterparts in the other two sister divisions, identified the "communication market" as the vertical market segment that CPI should focus on. This covers both the "telecommunication" market and the "datacommunication" market. Telecommunication means applications like telephone switching and wireless communication. Datacommunication means applications in internetworking, servers and hubs, etc. These were identified as high growth and relatively higher margin markets.

Efforts were then put in studying these vertical market segments, identifying the customers and understanding their power conversion problems. Through the effort in the past four years, Computer Products has established itself as a company closely related to communication. Many of the customers it penetrated turned out to be really high growth companies. The change in market perception on Computer Products, from seeing it as a traditional power supply maker to treating it as a designer and manufacturer closely related to "communication", also help improving the price/earning ratio of the company's stock in the U.S. market and resulted in a rapidly increasing stock price in 1995 and 1996. More details are provided in section 5.3.

4.5 Promoted Technology Innovation to Achieve Customer Enrichment

Because of the diversity of customers' demand and the rapid flow of product information, the power supply market is getting more and more competitive. In the past, cost and quality were competitive advantages, but as all power supply makers are striving for quality and competing with low cost by manufacturing in low cost countries, quality and cost have become merely necessary conditions for survival but not sufficient for growth. The author has been advocating the technology innovation and cycle time reduction as two new success factors. Practical methodologies to improve the product and technology development process, and to reduce the product development cycle time are presented in Submission 4[54]. The underlying philosophy is concurrent engineering.

The effort to promote technology innovation led to the establishment of the R&D centre in PCAP. In these two years, engineering resources were spent not just on product development but also on basic topology research. As a result, by the end of 1996, PCAP received its first patent developed by the Hong Kong engineers, and more are on the process of patent application.

The author sees that the ultimate goal of technology innovation and cycle time reduction is "customer enrichment". This means more than the traditional thinking of providing

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[54] Submission 4, *Beyond Technological Innovation - Delivering Value to our Customers*

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service or solution to the customers. Enriching the customers is to provide weapons that help the customers compete in their own market. In the power supply industry, this may mean providing a power conversion solution that can improve the added-value of the customers end products, and helping reducing the total product cycle time of the customers so that they can enjoy the benefit of an early introduction of their end products to the market.

Such strategy has been especially successful in penetrating global account of Computer Products. For example, a very major power project was won in a multinational account. The revenue of this project was over US$15 million in 1996 for PCAP. This is quite a good revenue for just one custom product.

The nature of the power supply business makes the ability to provide custom solutions very important. How to achieve customization and at the same time achieve cost objectives as in the case of mass production is a new challenge for power supply management. Directed by the author, a joint project on mass customization was conducted between PCAP and the Department of Industrial Engineering & Engineering Management of the Hong Kong University of Science & Technology in 1996. A joint report is included in this portfolio as Submission 9[55]. It is also discussed briefly in section 4.8.

4.6 Established Global Logistics

Establishment of the global logistics for the supply chain is a challenge for all companies competing in the world market. The development, the elements and the contributors to the supply chain of PCAP are reviewed and analysed in Submission 5[56]. Ways to improve the logistics management and to add value to the customers are also discussed in that submission.

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[55] Submission 9, *Design of Electronic Products for Mass Customization*

[56] Submission 5, *Total Quality Management of the Supply Chain Logistics in Computer Products Asia-Pacific Ltd.*

This global logistics has evolved through these years. Initially, CPI merely saw the Hong Kong plant as an off source manufacturing centre, with USA being the centre of business, technology and products development. The author was able to promote to the corporate the opportunities in Asia-Pacific, in the areas of low cost manufacturing, materials sourcing, market development, and technology innovation. A global networking of the supply chain is now formed that can provide the customers with leveraged resources. Customers of Computer Products recognised this, and they all see the value of such global logistics.

4.7 Promoted Partnership with Business Stakeholders

The author strongly advocates partnership with all the business stakeholders : customers, suppliers, bankers, government bodies, etc. Such partnership is important in establishing the global logistics, and is also used as one of the business development strategies.

In 1996, the author very successfully concluded a deal to transfer the High Density Power Conversion technology of CPI to a Japanese company. The technology includes both the Zero Voltage Switching topology and the Power Factor Correction know-how. The technology transferee will use such technology to develop its own product. As the technology transferor, CPI receives a transfer fee plus royalty on the sales of the transferee on products developed with the technology. This development of a strong business partnership with a Japanese company also opened a channel for PCAP to promote its products in the Japan power supply market which is difficult to access by foreign companies.

The above example illustrates the importance and usefulness of partnership in business development. The author's concept of teamwork and partnership has evolved outside the internal organisation.

4.8 Customer Enrichment through Mass Customization

The power supply market is very fragmented and the price competition is keen. To enrich the customers in this industry is to satisfy the high degree of flexibility and

responsiveness demanded by the customers, and at the same time be able to achieve cost leadership. These almost conflicting goals caused the author to think seriously about Mass Customization. It was decided at the end of 1995 to work with the Department of Industrial Engineering & Engineering Management of the Hong Kong University of Science & Technology to research on Design for Mass Customization of Power Supply Products. The programme lasted for one year, from the beginning of 1996 to the end of the year. The role of the author in this project, as head of the factory site of the research , was to direct the research from the power supply maker's point of view, give direction as to what product families to study, and to allocate resources from the factory to provide marketing and engineering inputs for the analysis.

Through the research, a systematic approach was developed to effectively characterise customers' requirements and develop subsequent physical design parameters to fulfil these requirements. A systematic approach was developed to formulate a product family architecture (PFA). Based on machine learning, the clusters of design parameters are identified to fulfil the functional requirements and, hence, optimise the common denominators in product family building blocks. With inherent product topologies, PFA also facilitates family-based design through the entire realisation process from customer to delivery. A detailed report on this research is provided in Submission 9[57].

The author has also decided to go into the second phase of the research in 1997. This second phase will cover the development and refinement of product family architecture, as well as the development of family based sales and marketing strategy.

On top of the various initiatives to improve the technology, quality, responsiveness, cost and delivery of PCAP to satisfy customers' need, the movement on mass Customization will bring the company to the next level of customer service - Customer Enrichment, which is an improvement element of the Agility Chain shown in Figure 14.

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[57] Submission 9, *Design of Electronic Products for Mass Customization*

4.9 Major Milestones of Change Programmes in PCAP

One of the key concepts of SCM is the need of a strong leadership to initiate new programmes of changes that continuously evolve the organisation toward new levels of excellence. The author has been proactively identifying new improvement programmes to address various aspects of the business. The major milestones of the Change Programmes are listed in Table 3.

Table 3 Major Milestones of SCM in PCAP

1988

3C Principles
- Charge
- Challenge
- Change

4M Centers
- Manufacturing Center
- Materials Center
- Marketing Center
- Management Center

Promotion of 5S
- Seiri
- Seiton
- Seiso
- Seiketsu
- Shitsuke

WCM
- World Class Manufacturing

Cross-functional Task Forces
- Asset Management
- Cost Reduction
- SIOP (Sales, Inventory and Operations Control)
- Quality Improvement

1989
- Started MBO program
- Started integrated training
- Set up JIT (Just-in-time) cells
- Strategic vendor management

1990
- Start ISO9001 Certification Program
- Started Vendor Quality Rating System as part of vendor management program
- Start MRP-II Upgrade Program
- Installed the 1st ATE (Automatic Testing Equipment)

1991
- Excellence in Training Award (Granted HKMA)
- MRP-II by upgraded to "ASK" Release 7
- The 1st ISO9001 granted by HKQAA
- Industry Department Quality Award/Governor's Award for Industry
- Start DOE (Design of Experiment) training

1992
- Start ISO9002 Certificate Program for Zhongshan plant
- The 1st company to win 2 grand prizes in Governor's Award for Industry - Quality
  - Productivity
- Applied DOE technique on testing
- Start Concurrent Engineering
- Establish Task Forces on
  - Cost Effectiveness
  - Technology Orientation
  - Market Orientation
  - Team Work
- Start COQ (Cost of Quality)

1993
- Cost of Quality Program
- Operational Excellence Survey
- The 1st ISO9002 in Zhongshan city
- Certificate of Merit in Environmental Performance (1993 Governor's Award for Industry)
- Establish Task Forces on
  - Inventory & Cycle Time Reduction
  - Quality Improvement
  - Concurrent Product Development
  - Cost Reduction

1994
- Comprehensive Training & Development Plan
- Workmanship Skills Re-certification Program
- Installation of LAN/WAN (Local-Area-Network & Wide-Area-Network)
- Establish the first private leased line in Zhongshan
- Electronic forecast and BOM (Bill of Materials) transfer

1995
- Introduce PACE (Product & Cycle Time Excellence) Program
- HP3000 hardware upgrade
- Finished Goods Bar-Coding System
- Establish Research Team
- Establish Technology Development Task Force

1996
- Mass Customization research with HKUST
- Establish Global Procurement Team
- Establish PACE Product Transfer Team
- Introduce Patent Award Program
- Preferred part database
- Appointment of MSR (Manufacturing Site Representatives)
- 2nd phase of WAN
- HALT (Highly Accelerated Life Test)
- QIS (Quality Information System)

5. Evaluation of the Results of SCM in PCAP

5.1 Operations Performance

The most important key drivers of PCAP's manufacturing operations are cost and quality. There are many other parameters being tracked in PCAP, but for the purpose of evaluating the result of the author's Strategic Change Management, these two key drivers are used here.

Figure 15 shows the changes in manufacturing sales of PCAP from 1988 to 1996. These sales mean the internal sales of the power supplies and converters produced by PCAP for the sister divisions and also for the PCAP sales and marketing department. Such internal sales are basically at cost, but the transfer pricing strategy varied in the past from year to year. Sometimes, no margin was allowed in PCAP, but sometimes a certain margin was allowed, depending on the overall taxation consideration. Therefore, in the chart, the income contribution does not actually mean the profitability.

Figure 16 shows the reduction of transfer price in these years. Again, because of the reason stated in the last paragraph, the transfer price reduction may not reflect the manufacturing cost reduction fully.

Figure 17 shows the true reduction in manufacturing cost in PCAP in each year from 1988 to 1996, related to the previous year. This indicates a continuous cost reduction, with an annual rate that has been improving from year to year. This is a very good achievement.

Figures 18 and 19 show respectively the overall test yield and the outgoing product quality of PCAP from 1988 to 1996. These charts show continuous improvement from year to year.

Figure 15

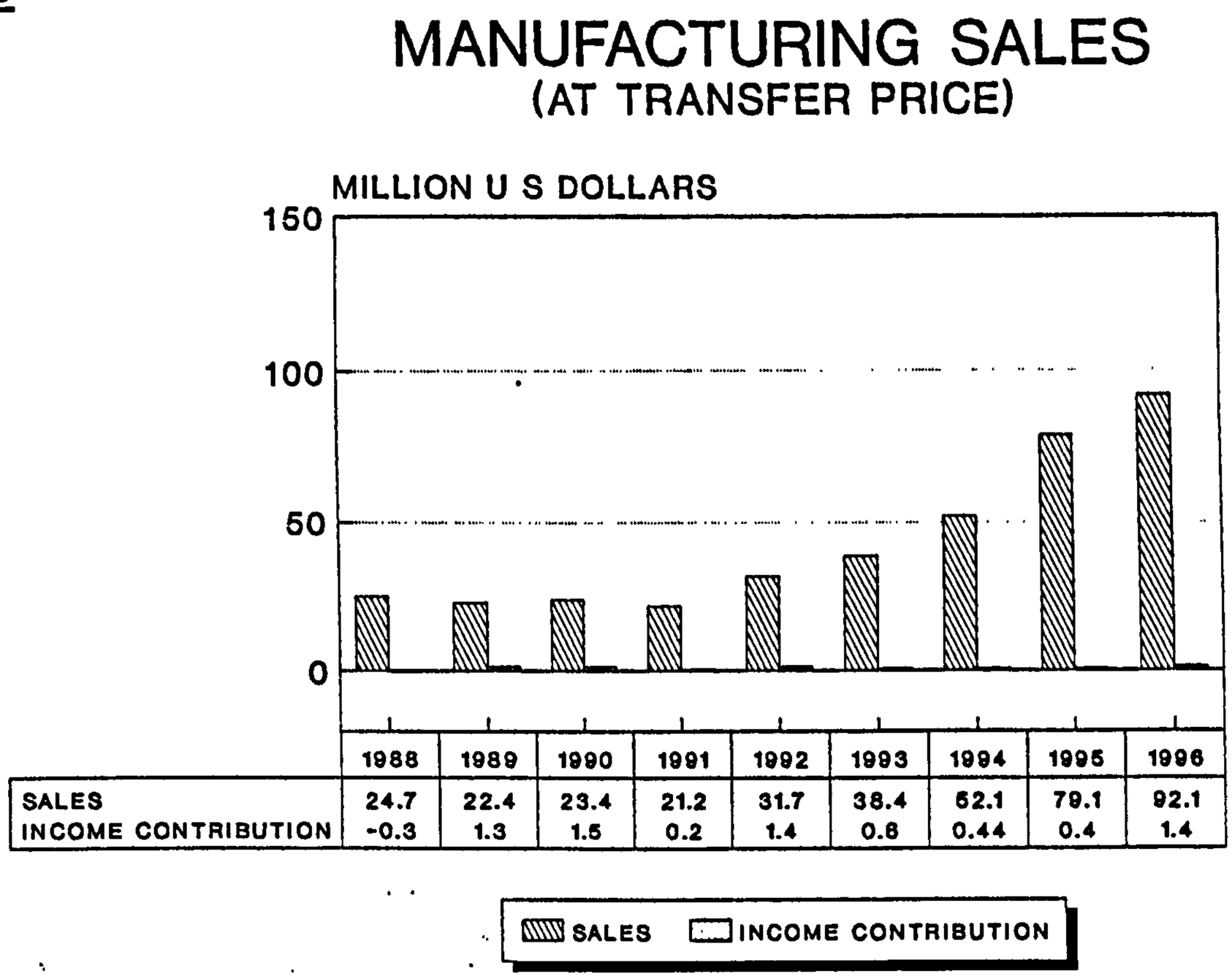


Figure 16

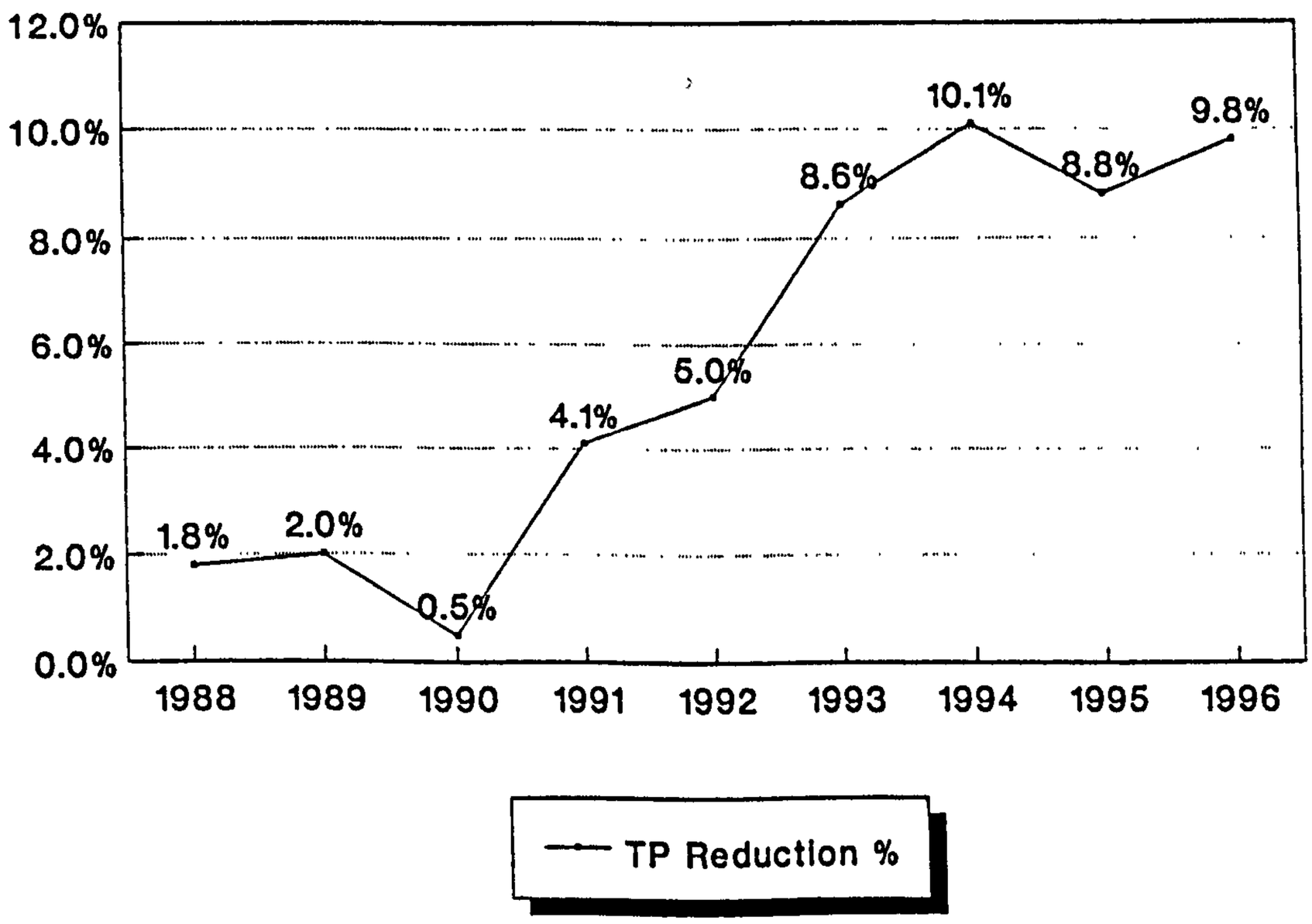


Figure 17

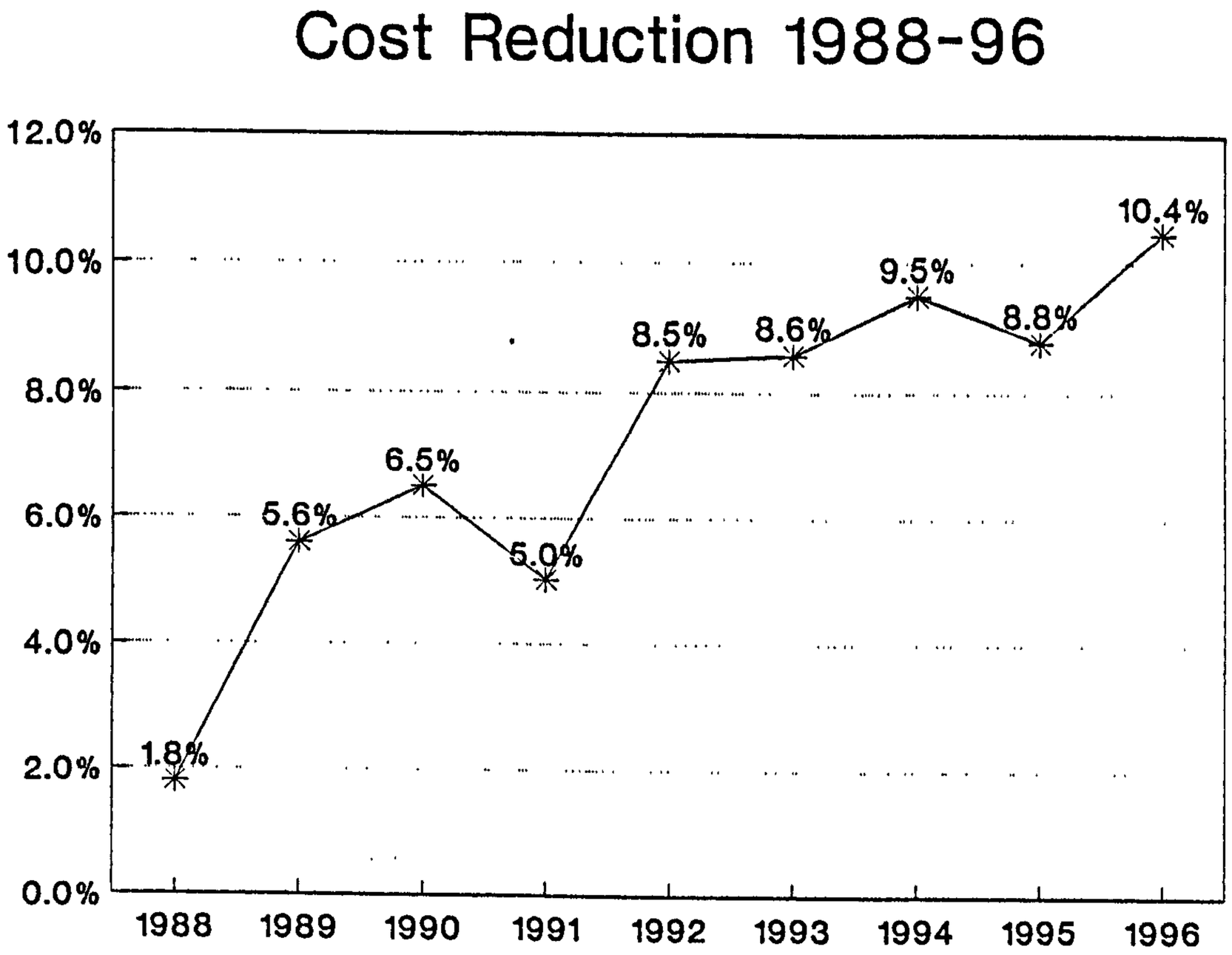
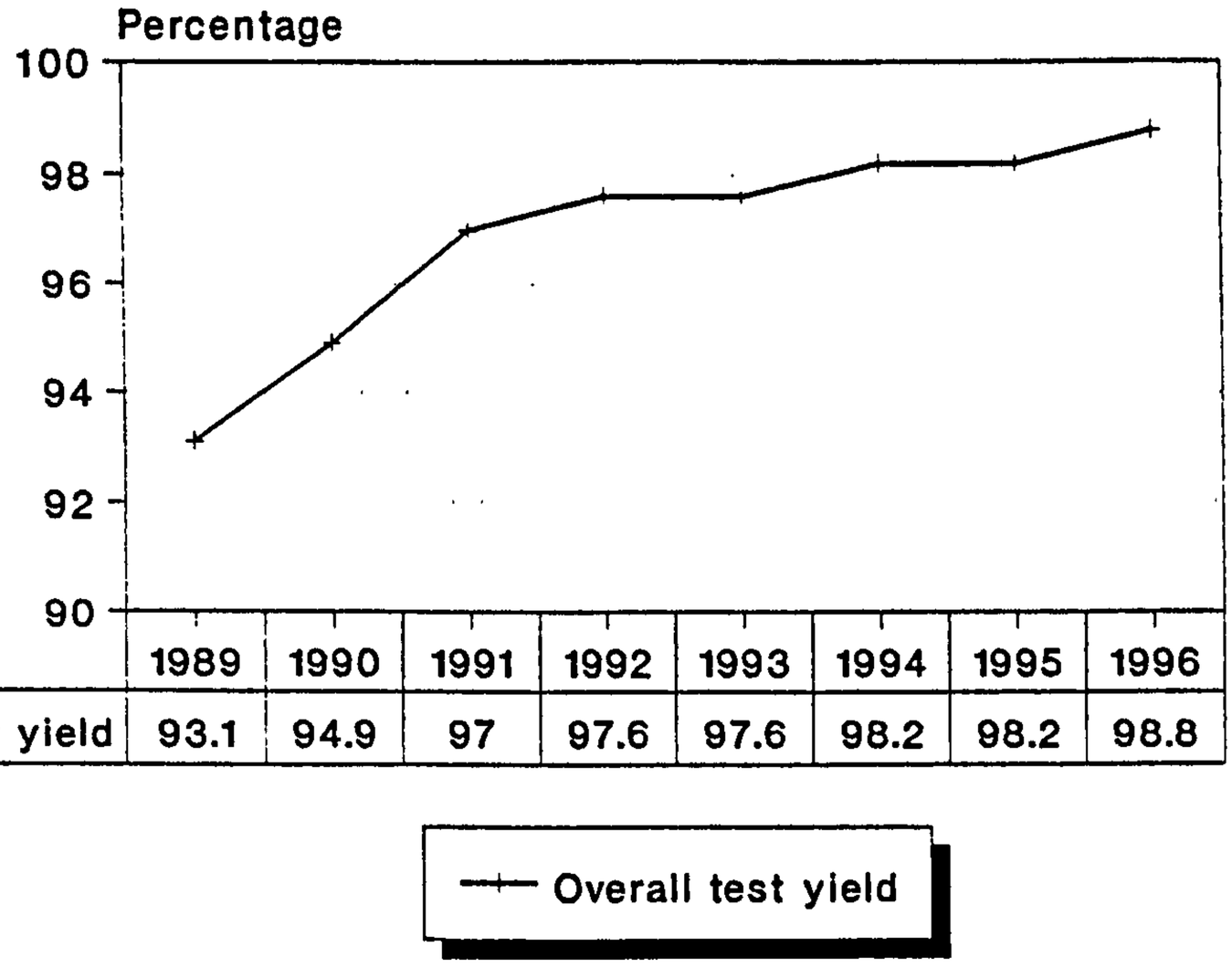

Cost Reduction 1988-96
12.0%
10.0%
8.0%
6.0%
4.0%
2.0%
0.0%
1.8%
5.6%
6.5%
5.0%
8.5%
8.6%
9.5%
8.8%
10.4%
1988
1989
1990
1991
1992
1993
1994
1995
1996

Figure 18

AC/DC Power Supplies Overall Test Yield (1989 - 1996)



DC/DC Converters Overall Test Yield (1989 - 1996)

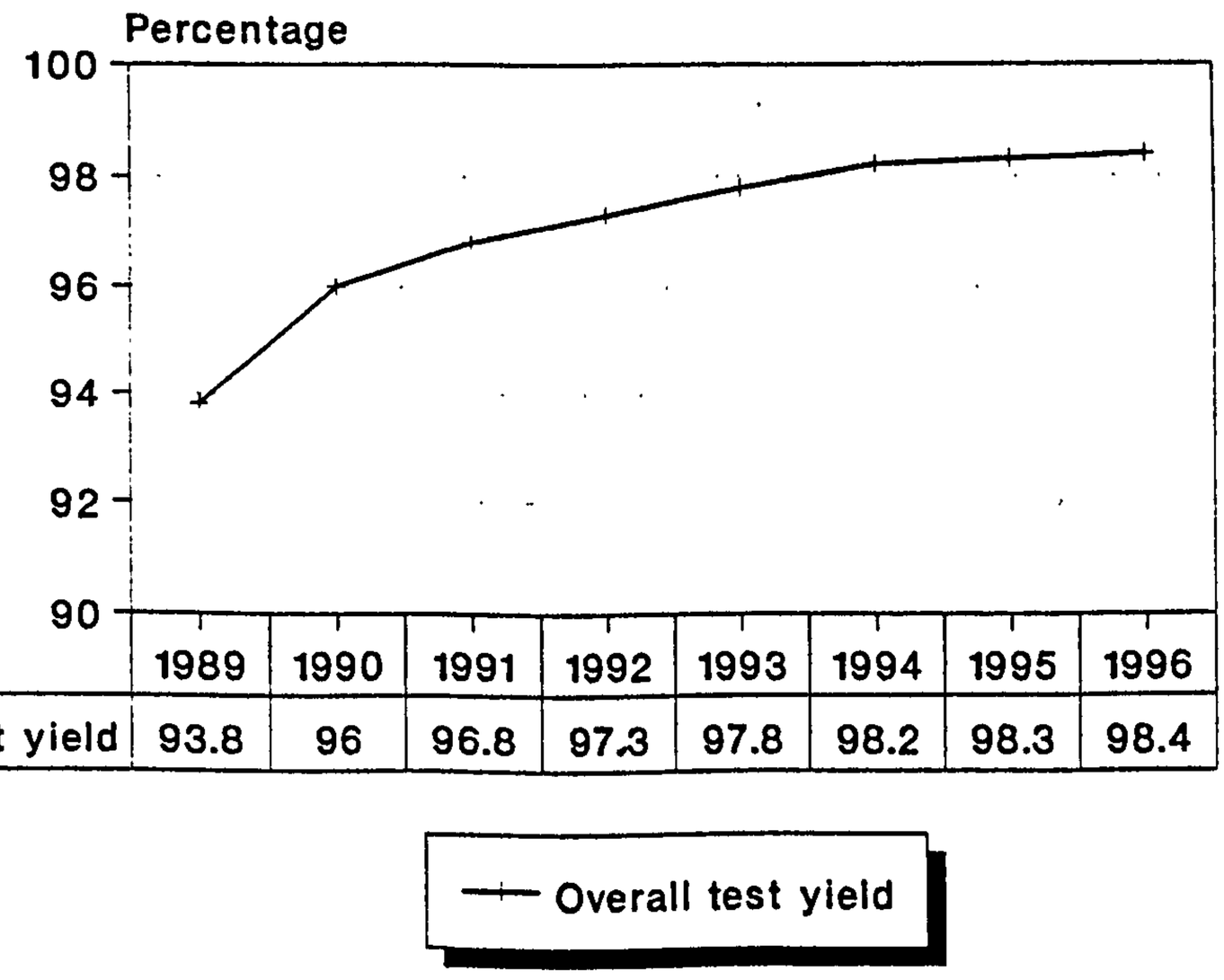
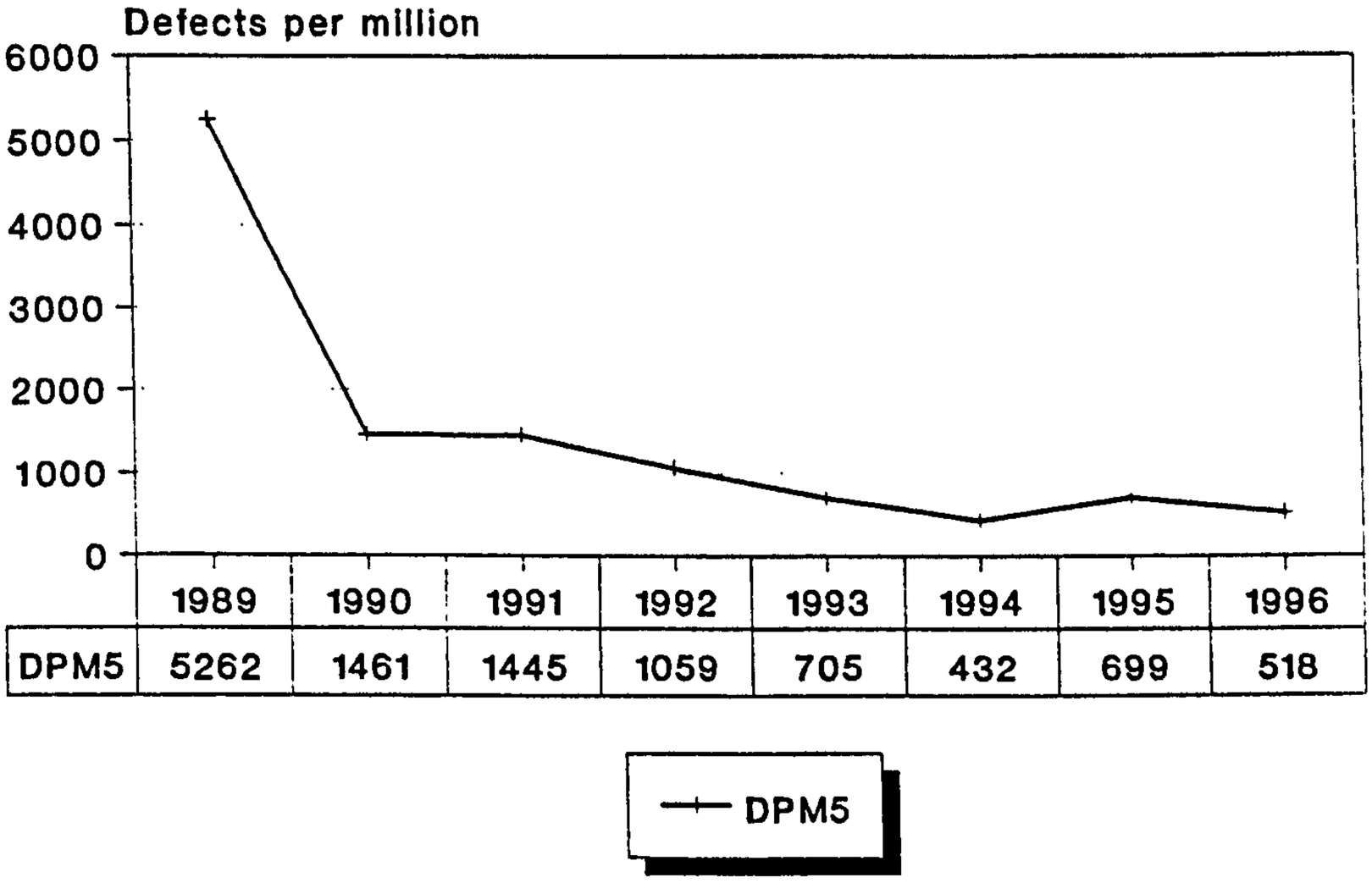
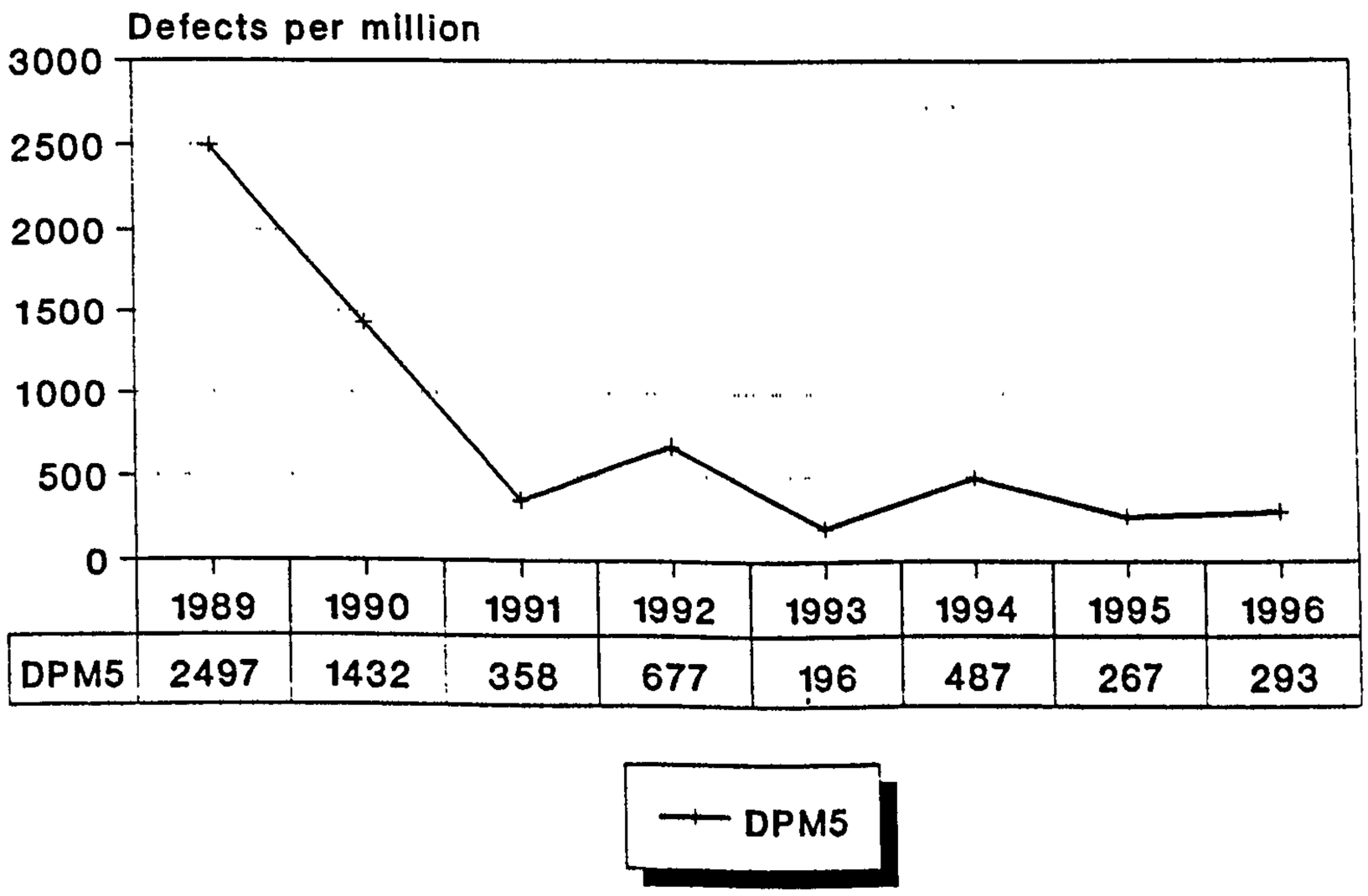


Figure 19

DPM5 for AC/DC Power Supplies (1989 - 1996)



DPM5 for DC/DC Converters (1989 - 1996)



5.2 Financial Performance

The financial performance of CPI in the last five years has been very encouraging. As the major operations centre of CPI, PCAP did contribute to such growth and profitability. The financial results of CPI world-wide from 1992 to 1996 are shown in Figure 20.

Figure 20 Financial Results of CPI 1992-1996

	(US$'000)				
	1992	**1993**	**1994**	**1995**	**1996**
Sales	114,799	123,790	154,800	191,378	222,485
Operating income	6,908	3,900	12,478	21,757	28,937
Income after taxes	2,002	597	6,059	14,117	19,578
Per share	0.10	0.03	0.29	0.61	0.80
Net income	2,676	2,867	6,059	13,720	19,578
Earning per share (US$/share)	0.13	0.14	0.29	0.59	0.80

5.3 Stock Price & Market Perception

The movement of stock price of CPI in the NASDAQ Stock Market in the USA from 1992 to 1996 is shown in Figure 21.[58] It shows very obviously that 1995 and 1996 are two years of very strong appreciation of the stock price of CPI. In fact, a lot of senior managers of CPI, including those in PCAP, enjoyed very good financial return with their stock options in these two years.

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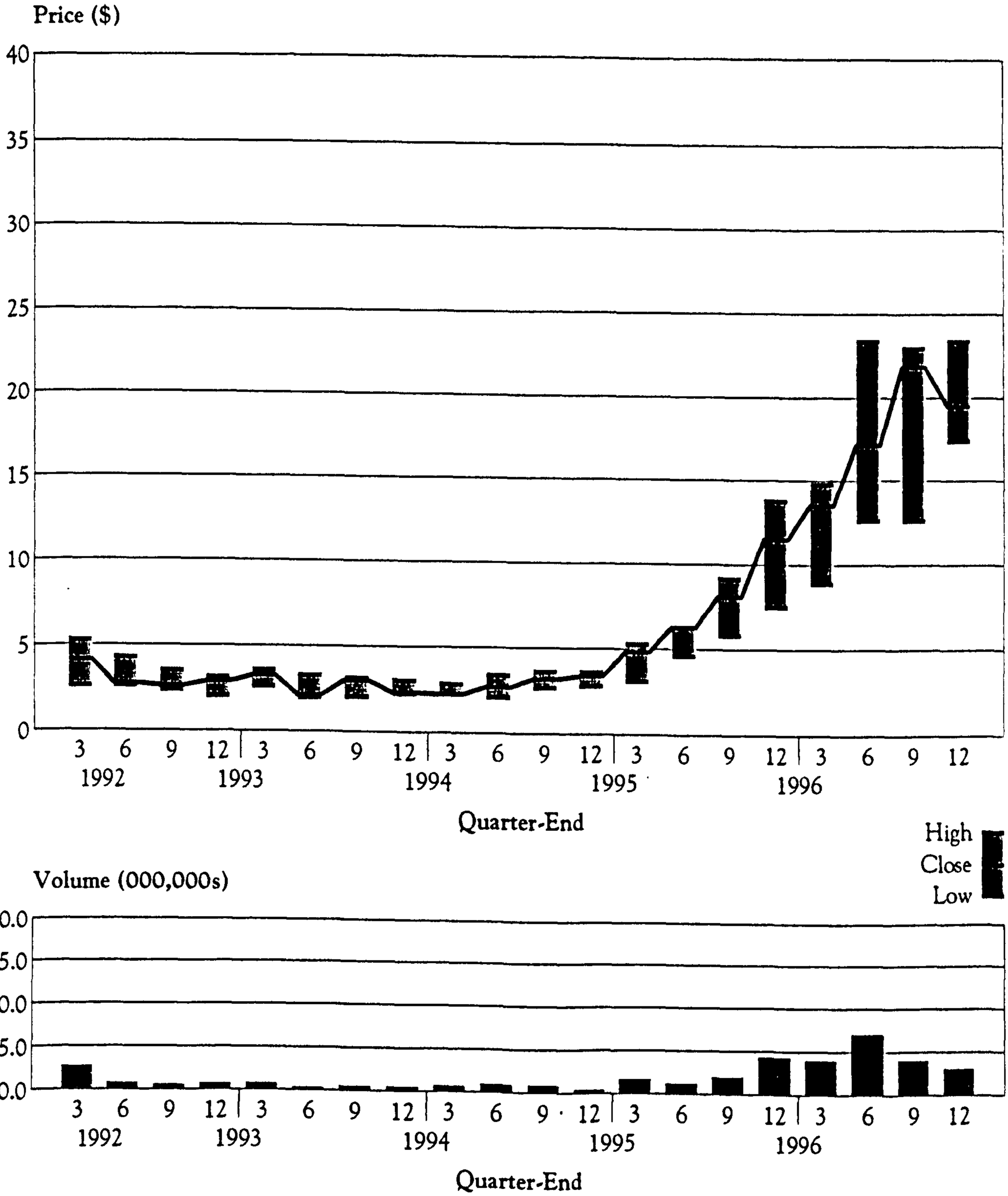
[58] Corporate Record, Computer Products. Inc., 4th Quarter, 1996, published by The NASDAQ Stock Market.

Figure 21

Quarterly Price and Share Volume
Computer Products Inc



Source: CDA Investment Technologies, Inc. & The Nasdaq Stock Market
Data as of December 31, 1996

NASDAQ

The optimism of the market on CPI stock is not of no ground. The stock analysis report from Robertson, Stephens & Company stated that :

> *".....management has restructured company to better serve a broader group of fast-growing companies. Among the changes are (1) a greater emphasis on communications customers, (2) improved customer service based on its First Person Service program, (3) lower costs through increased use of modular product platforms, enhanced automation, global purchasing practices, and low cost manufacturing locations, (4) higher R & D spending, and (5) faster time to market. For example, in 1994, new product platforms took an average of 72 weeks to bring to market. In 1996, the average lead time was 36 weeks and the objective for 1997 is 24 weeks. As further evidence, by 1997, the company plans to generate 70% of its power systems revenues from products developed since 1995.*
>
> *We believe the use of concurrent engineering teams to reduce cycle times should not only reduce total costs but may also become increasingly important in winning new contracts since power systems must often be designed and configured very early in the development of a new product. In addition, with a greater industry focus on performance, service, delivery, and price, we believe a low-cost, rapid response organisation should be able to gain market share in this fragmented industry."*

Commenting on the marketing strategy, the report from Robertson, Stephens & Company stated that :

> *"Computer Products has targeted the top 50 communications OEMs in the world as customers and is currently serving more than 25 of these accounts with plans to penetrate an additional 2-3 accounts each year. Currently, Computer Products is one of the only power systems companies that utilises a four-tiered distribution strategy including (1) third-party distributors, serving 6,100 customer (960 salespeople, 20% of divisions sales), (2) sales representatives focusing on 65 smaller OEM accounts*

(140, 20%), (3) a direct sales force targeting 50 large OEM accounts (46, 55%) and (4) a small private label team servicing 5 accounts (3, 5%). We believe management's gala is to work with the first two groups to sell standard products to a wide range of customers who require lower volumes. These channels also serve as a spawning ground for the company as customers grow into larger accounts seeking increased volumes, custom products, and/or the personal attention and service Computer Products has to offer. Importantly, we believe switching costs are high and new accounts are likely to remain with Computer Products for years as long as it maintains its focus on cost, quality, performance and service. To ensure consistent objectives, third-party distributors and sales representative groups continue to receive a commission, albeit a smaller percentage, as customers move up to being directly served by Computer Products.", and that

"Based on a survey of industry participants, Computer Products is one of the few companies with a significant market position serving communications equipment markets. The company also has a growing position (estimated 20% of division sales) in the higher end of the merchant computing equipment (file servers, workstations) power systems market, which represents 20% of division sales and is growing 14% per year.",

"Among the drivers for growth in these markets are (1) increasing acceptance of the Internet, (2) greater productivity and efficiency gains from networking corporate computers, (3) greater demand for cellular applications such as personal communications services, and (4) the ongoing trends towards deregulating telecommunications markets."

These comments from the analysts reflects that the operations, marketing and technology innovation and cycle time reduction strategies of the company are well accepted by the investment market.

5.4 Assessment of Job Satisfaction, Organisation Excellence, Agility and Improvement Elements - Employees' Perception

The author has conducted an empirical study in PCAP to assess the employees' ratings on Job Satisfaction (SAT), Organisation Excellence (EX), Agility (AG) and Continuous Improvement Elements (IMP). IMP refers to those continuous improvement actions, programmes and concepts introduced to PCAP in the past eight years. Details of the study is in Submission 8[59].

The main objective of the study is to evaluate the effectiveness of the Strategic Change Management implemented by the author in PCAP, and whether this can lead to agility. In particular the purposes of this study are to investigate :-

1. the factor structure of SAT,
2. the factor structure of EX,
3. the factor structure of AG,
4. the ratings on these three sets of factors relative to seniority levels and length of service in PCAP,
5. the factor structure of IMP implemented in PCAP,
6. the relationship among SAT, EX, AG and IMP.

5.4.1 Methodology of the Study

The perception of the staff of PCAP on SAT, EX, AG, and IMP is measured by means of four respective sets of questionnaires (Appendix 1).

(i) The questionnaire on SAT is set referring to the job satisfaction questionnaire used by the author and Rufin Mak in 1984[60], with 51 variables.

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[59] Submission 8, *An Empirical Study of Employee Job Satisfaction, Organisation Excellence and Agility - Their Factor Structures and Correlations*

[60] Lo, W.K., Mak, B.L. Rufin, *An Empirical Studyof Employee Job Satisfaction and Organisation Excellence - Their Factor Structures and Correlations*, Thesis of Master of Business Administration, The Chinese University of Hong Kong, May 1984.

(ii) Based on the author's previous work, an EX questionnaire was designed with 25 questions. These questions are related to the eight organisation excellence characteristics described in Peter & Waterman's report[61] without reference directly to them. These eight characteristics are :-

- Bias for action
- Close to customers
- Autonomy and entrepreneurship
- Productivity through people
- Hands on, value driven
- Stick to the knitting
- Simple form, lean staff
- Simultaneous loose-tight properties

(iii) The questionnaire on AG is developed based on a self-assessment approach to measure agility suggested by Goldman, Nagel and Preiss[62].

They list a number of useful general questions, from which a company should determine which questions will favourably impact its agile business strategy. These totally 87 questions are supposed to measure the principle dimensions of agility that Goldman, Nagel, and Preiss formulate intuitively, without being quantitatively tested. These principle dimensions are :-

- Enriching the customer
- Co-operating to enhance competitiveness
- Mastering change and uncertainty
- Leveraging people and information

For the present study, 72 questions are developed. These are re-phrased from the 87 questions suggested by Goldman, Nagel and Preiss, with 15

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61 Peters, T.J. & Waterman, R.H. Jr., *In Search of Excellence, Lessons from America's Best-Run Companies"*, New York : Harper & Row, 1982.

62 Goldman, S.; Nagel, R. & Preiss, K., *Agile Competitors and Virtual Organisation*, Van Nostrand Reinhold, 1995, [ISBN 0-442-01903-3]

questions dropped due to their possible ambiguity from PCAP's staff perception.

For the above three questionnaires, the respondents are asked to assess whether each statement is descriptive of the organisation, and put the answer on the 7-point scale from "Strongly disagree" (-3) to "strongly agree" (+3), and also situation is improving or deteriorating from "obviously deteriorating" (-3) to "obviously improving" (+3).

(iv) The questionnaire on IMP is designed to ask the respondents about how relevant the actions, programmes and concepts that have been implemented in PCAP are toward the improved performance in recent years in PCAP. The answer needs to be put on a 11-point scale from "Not relevant" (0) to "Highly relevant and important" (10). Totally 40 questions are listed. These are all actions, programmes and concepts that the author promoted in PCAP from 1988 to 1996.

5.4.2 Sample Size

The survey, conducted by the author in March, 1997, covered all the 240 staff members in PCAP's Hong Kong plant. Junior members who could not understand the questions due to English language ability were excused. Total 179 sets of questionnaires were returned. The respondents were asked to fill in some data of themselves, including job title, department, data joined, age and length of service.

5.4.3 Method of Analysis

Statistical analyses are carried out on two PC-based software packages, namely, Microsoft Excel 5.0 (EXCEL) and SPSS for Windows 6.0 (SPSS) in a complimentary manner. Data collected from the questionnaires are first logged onto an EXCEL spreadsheet. This offers a definite advantage in data entry as Excel is far more popular than SPSS and helpers can be found easily to input this

information, hence shortening the time required to start analysis. Besides, simple formulation and sub-grouping mechanisms can be set up in a much easier way in EXCEL as compared with the SPSS data transformation module. Demographic analysis on means and variances are, therefore, prepared in EXCEL.

However, the critical and sophisticated statistical analysis, including

1. factor analysis, and
2. correlation analysis among factors of SAT, EX, AG and IMP

are done under SPSS.

5.4.4 Results of the Survey

Detailed results of the survey are given in Submission 8. The major findings can be summarised as follows :

(i) Factor structures are identified for SAT, EX, AG and IMP. The numbers of factors identified for the four structures are eight, three, seven and six respectively.

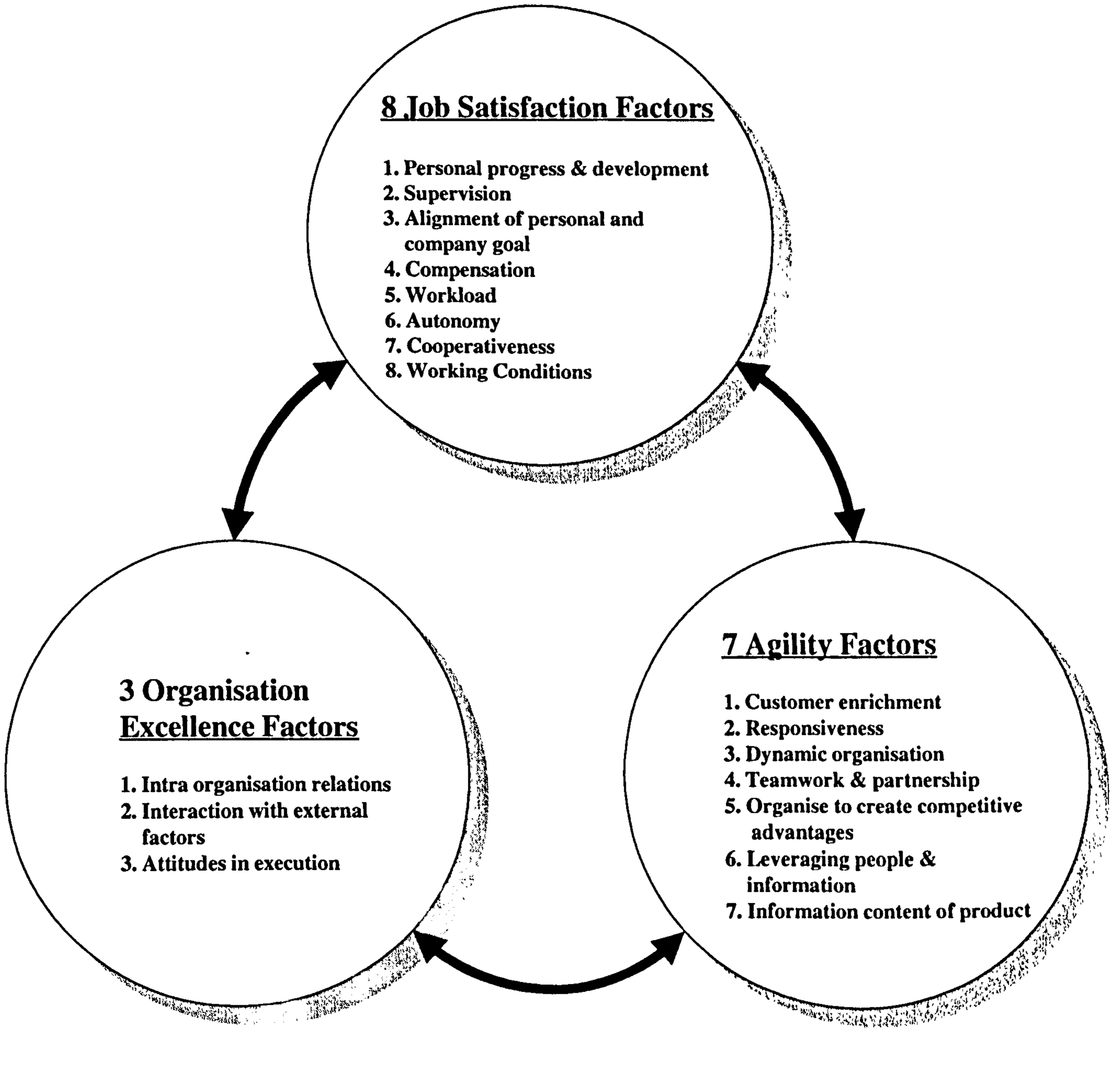
(ii) The factor structures of SAT, EX and AG are found to have strong correlation. These structures are shown in Figure 22.

(iii) The factor structure of the continuous improvement elements derived from the survey are :

1. Functional improvement
2. Concurrence
3. Company-wide improvement
4. Logistics improvement
5. Systems
6. Award

They do not show any strong relationship with SAT, EX or AG.

Figure 22 Relation among Job Satisfaction, Organisation Excellence and Agility



(iv) Submission 8 shows how the ratings of factors are related to tenure and levels of the employees. Details are not discussed here.

(vii) SAT and EX ratings are averaging around +1, indicating positive perception of the staff of PCAP in these two aspects. The same applies to AG ratings, though agility is a relatively new concept to PCAP employees.

The positive ratings for all SAT, EX, AG of PCAP employees imply a healthy trend of the company in moving toward excellence and agility and at the same time, achieving employee satisfaction.

The strong correlation of agility factors to the Satisfaction and Excellence factors, plus the positive ratings of PCAP employees on agility (all close to +1) indicate strongly that PCAP is moving toward agility. This is a proof of the success of the author's SCM implementation in PCAP.

6. Conclusion

6.1 Summary of Results

The Portfolio addresses a wide spectrum of business issues. The theory of change management is reviewed and a new concept of Strategic Change Management (SCM) is introduced. A detailed review is carried out to assess the internal and external environment of PCAP, from which the strategy for the change is formulated. The practical approach to use the model of SCM to improve various aspects of the business as well as the effectiveness of the model are demonstrated through application of the model in PCAP.

The results of SCM implementation in PCAP are evaluated from the angles of operations performance, financial performance, stock performance and change in market perception of the company. An empirical study is conducted to identify the factor structures of Job Satisfaction, Organisation Excellence and Agility. The results showed a strong correlation among these three factor structures, which also imply the moving of PCAP toward Agility.

6.2 Areas of Innovation Demonstrated

The areas of innovation demonstrated in the Portfolio are :

6.2.1 Created the Concept and Model of Strategic Change Management (SCM)

While there are a lot of management theories on the topic of change management, the SCM created by the author is a comprehensive and practical model, and is an important enhancement to the theory of change management. The application, implementation and effectiveness of SCM have been demonstrated and evaluated in the Portfolio.

The SCM model advocated by the author starts with creating the culture for change. The author has demonstrated how to create such culture using his real

life experience in a power supply manufacturing company in Hong Kong which he turned around. The second step of SCM is analysing the system. The author demonstrated a comprehensive qualitative analysis of the economical, social and cultural environment of the company and the market forces. The step that follows is the implementation cycle, including the elements of setting priority, organising, performance measurement, rewarding winners and reinforcement. The author has presented in all these areas practical approaches to manage the changes. The SCM model and the various practical approaches to management of various stages of change are transferable to other organisations.

6.2.2 Pioneered the Concept of Agile Manufacturing in Hong Kong

The concept of agility or agile manufacturing is relatively new to the manufacturing industry in Hong Kong. Very few papers talk about agility in Hong Kong. No paper talks about any practical case of implementing or achieving agility in a Hong Kong company. The work of the author should be the first in this area in Hong Kong.

In his research, the author demonstrated a successful transformation of the organisation toward agility. As reported in this Executive Summary, the Strategic Change Management implemented in PCAP has led to agility. The state of agility is perceived by the author as an **Agility Chain**, which he created from Michael Porter's Generic Value Chain and Agile Manufacturing. This is a new concept as the author could find no other papers intending to merge the two theories together.

6.2.3 Innovative Method to Study Empirically the Factor Structure and Correlation of Employee Job Satisfaction, Organisation Excellence and Agility

While there are papers talking about the assessment of agility, there has not been any empirical study to measure agility from the perception of employees of a company.

The author has conducted an innovative empirical study through surveying employees' ratings on SAT, EX, AG and IMP to assess the factor structure and correlation of Employee Job Satisfaction, Organisation Excellence and Agility.[63] The results from the empirical study are useful for comparing with the corresponding factor structures from management theories, and for identifying new initiatives to improve the organisation.

This empirical method of employees perception survey, factorial analysis and correlation analysis is transferable to any other organisations, in their assessment of job satisfaction, excellence and/or agility,

6.2.4 Pioneered ISO9000 in Hong Kong

When the author advocated and implemented ISO9000 in his company in Hong Kong, the concept and practical way to achieve ISO9000 were relatively new to Hong Kong. The author was among the pioneers of ISO9000 in the local industry.

In the power supply industry in Asia, ISO9000 was also relatively new in the year 1990 when the author actually started designing and implementing ISO9001 in PCAP. No major power supply makers in Asia had been certified ISO9000 by that time.

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63 Submission 8, *An Empirical Study of Employee Job Satisfaction, Organisation Excellence and Agility - Their Factor Structures and Correlations*

To become the first company in Hong Kong certified ISO9001 by the Hong Kong Quality Assurance Agency in 1991 was a success that substantially improved the company's reputation, and built up its competitive advantage. This demonstrates innovation in practice in the author's pursuance of excellence of business management.[64]

The Zhongshan factory of PCAP also became the first ISO9000 company in the City of Zhongshan in the southern part of China in the year 1993.

The author's experience in ISO9000 has been a motivator for other companies in Hong Kong during the years when ISO9000 was not yet very popular locally.

6.2.5 Promotion of 3C to Create a Culture of for SCM

The author used this slogan to create a culture of change in the company. He himself has been acting as a role model who has the courage to face challenge, the ability to manage change, and the industriousness to charge himself. The 3C slogan is simple and easy to understand. However, to make it a management tool to help change the culture of a company, the top management has to be a role model and has to be persistent and consistent in doing so. The author has demonstrated a successful case in this. He has been advocating this concept through seminars, conferences and papers.

6.2.6 Application of Deming's Principles in Managing Evolutionary Changes in a Company in Hong Kong

The road map of PCAP in its pursuance of operational excellence is an example of evolutionary change management. The author used Deming's 14 Principles to transform the culture of the company so that employees see managing changes as

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64 Submission 1, *ISO9000, Foundation for TQM : A Hong Kong Experience in Achieving Operational Excellence through Evolutionary Changes*

their normal way of doing business, and are able to initiate and implement continuous improvement.[65] This demonstrates innovation in application of a well known management concept in a business environment in Hong Kong.

While Deming's theory of management is not really new in Hong Kong, there are not many practical cases reported in the implementation of the 14 Principles in local manufacturing companies. The author's experience shows that Deming's theory is applicable in Hong Kong where the Eastern culture meets with the West.

6.2.7 Enhancement of a Practical Concurrent Engineering Process for Product Transfer in a Multi-location Operations

The concept of PACE (Product and Cycle-time Excellence) was developed by the PRTM consultant, but the author enriched this concept by formulating a practical Design Transfer Core Team process that has been used to improve the transfer of products from design to production.[66] This is an important enhancement to concurrent engineering, particularly for multinationals which have separated multiple design sites and production sites.

Design transfer from a design location to a manufacturing location is a common problem in multinationals. It is a problem because it quite often means transferring the design from one continent to another for manufacturing, where the culture and way of doing things are different, and communication is always ineffective between the two locations. The author's enhancement to PACE provides a practical solution to such difficult situation.

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[65] Submission 3, *Application of Deming's Principles in the Management of Change - A Hong Kong Experience*

[66] Submission 4, *Beyond Technological Innovation - Delivering Value to our Customers*

6.2.8 Development of a Practical Approach for Renovating Information System

The author demonstrated a practical integrated approach to analyse the information system and develop the strategy to renovate the system.[67] The implementation of the strategy has been demonstrated and successfully achieved in his company. This is again an innovation in practice. This is particularly important in the power supply industry where factories are normally working with a large component database, under pressure from customers to reduce cycle time, and yet with a long supply cycle time.

6.2.9 Development of a What-if Prototype to Tackle Dynamic Changes in the MRP II

The What-if Prototype is developed to tackle demand and materials changes in PCAP[68], and this model can be applied in other electronic manufacturing companies to improve responsiveness of the MRP II systems to demand changes.

While there are software products available in the market to solve similar problems, this What-if Prototype can be used to assess and compare such solutions, whether ready made or tailored.

6.2.10 Mass Customization for Power Supply Design

While Mass Customization is quite a hot research topic in recent years, there are not many practical cases reported in the application of such theory in an industry, and not any in the power supply industry.

Researching jointly with the Hong Kong University of Science and Technology, the author applied concept of Mass Customization in Power Supply design[69].

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[67] Submission 6, *Renovating Information Systems to Achieve Competitive Advantage - Development of the Strategy*

[68] Submission 7, *Review of a Common Problem in MRP II Systems and Development of a What-If Prototype to Tackle Dynamic Changes in a Flexible Electronics Manufacturing System*

[69] Submission 9, *Design of Electronic Products for Mass Customization*

Based on a systematic approach, a power supply family architecture has been established to synchronise market positioning, solicit customers requirements, increase commonality in product designs and enhance manufacturing scale of economy. This is an important tool to achieve the seemingly conflicting goals of efficiency and product variety. This demonstrates innovation in application of a new management concept in a competitive business environment.

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DATA OF PARTICIPANT

Present job title : _____ Department : _____

Date joined PCAP : _____ (M)_____ (D)_____(Y) Age : _____

Length of service : _____years_____month

Part I

SATISFACTION

Answer A

In this section you are asked to evaluate how satisfied you are with various aspects of your job and the organisation. You should ask, "on my present job, how satisfied am I with respect to this?" Give your answer by a (✓) in the appropriate box on the 7-point scale.

(-3) Very dissatisfied.
(-2) Somewhat dissatisfied .
(-1) Slightly dissatisfied.
(0) Neither dissatisfied nor satisfied.
(1) Slightly satisfied.
(2) Somewhat satisfied.
(3) Very satisfied.

Answer B

For each of the item no matter what the present situation is and whether you are satisfied, please ask yourself whether your degree of satisfaction is improving or deteriorating since you joined the company. Again, give your answer by a (✓) in the appropriate box on the 7-point scale.

(-3) Obviously deteriorating
(-2) Somewhat deteriorating .
(-1) Slightly deteriorating.
(0) Remain the same.
(1) Slightly improving.
(2) Somewhat improving.
(3) Obviously improving.

		Answer A							**Answer B**						
		Very dissatisfied	**Somewhat dissatisfied**	**Slightly dissatisfied**	**Neither dissatisfied nor satisfied**	**Slightly satisfied**	**Somewhat satisfied**	**Very satisfied**	**Obviously deteriorating**	**Somewhat deteriorating**	**Slightly deteriorating**	**Remain the same**	**Slightly improving**	**Somewhat improving**	**Obviously improving**
		-3	-2	-1	0	1	2	3	-3	-2	-1	0	1	2	3
1	The chance to be of service to others.														
2	The competence of my immediate supervisor in management practices.														
3	The way my job allows me to use my time effectively.														

		Answer A	Answer B
		Very dissatisfied Somewhat dissatisfied Slightly dissatisfied Neither dissatisfied nor satisfied Slightly satisfied Somewhat satisfied Very satisfied	Obviously deteriorating Somewhat deteriorating Slightly deteriorating Remain the same Slightly improving Somewhat improving Obviously improving
		-3 -2 -1 0 1 2 3	-3 -2 -1 0 1 2 3
4	My supervisor's ability to communicate well with his/her staff.		
5	The way my job allows me to make full use of my abilities.		
6	The amount of challenge in my job.		
7	My opportunities for promotion and advancement.		
8	The amount of pay I receive for the work I do.		
9	The way my job is secure as long as I perform well.		
10	The way I have freedom to do my job the way I want to.		
11	The way my ideas are listened to and acted upon.		
12	My working conditions.		
13	The way my co-workers are friendly and cooperative.		
14	The recognition I get for doing a good job.		
15	The feeling of accomplishment I get from my job.		
16	My pay compared to others with the same qualifications.		
17	My workload.		
18	The way I am told how well I am doing.		
19	My benefits package.		
20	Cooperation between my department and other departments.		
21	The way my job gives me a chance to do a variety of kinds of work.		
22	Opportunities for training and development.		
23	The fairness of promotion procedures.		
24	The usefulness of performance reviews.		
25	The understanding I have of the company's goals and plans.		

	Answer A	Answer B
	Very dissatisfied / Somewhat dissatisfied / Slightly dissatisfied / Neither dissatisfied nor satisfied / Slightly satisfied / Somewhat satisfied / Very satisfied	Obviously deteriorating / Somewhat deteriorating / Slightly deteriorating / Remain the same / Slightly improving / Somewhat improving / Obviously improving
	-3 / -2 / -1 / 0 / 1 / 2 / 3	-3 / -2 / -1 / 0 / 1 / 2 / 3
26	The way new employees are oriented to their jobs.	
27	My pay compared to others in this organisation.	
28	The relationship with my supervisor.	
29	My long-term career prospects in the organisation.	
30	My job, all things considered.	
31	The trust and respect the company has for its employees.	
32	The way the company tells employees of changes that affect them.	
33	The chance to express my opinions about matters relating to may work.	
34	The ability of my superiors to make good decisions.	
35	The way my supervisor deals with poor performers.	
36	The way I can take pride in working for the company.	
37	The way I am appreciated for the contribution I make to the company.	
38	The spirit of cooperation among my fellow workers.	
39	The methods used in assigning jobs and tasks.	
40	The extent to which action is taken on suggestions made by employees.	
41	The degree to which the company is effectively managed and well-run (overall).	
42	The way I know just what is expected of me; the way performance standards are clear.	
43	The way promotions are based upon merit and performance, rather than on tenure alone.	
44	The amount of supervision I receive.	

		Answer A							Answer B						
		Very dissatisfied	Somewhat dissatisfied	Slightly dissatisfied	Neither dissatisfied nor satisfied	Slightly satisfied	Somewhat satisfied	Very satisfied	Obviously deteriorating	Somewhat deteriorating	Slightly deteriorating	Remain the same	Slightly improving	Somewhat improving	Obviously improving
		-3	-2	-1	0	1	2	3	-3	-2	-1	0	1	2	3
45	The availability of supplies and equipment I need to do my job.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
46	The amount of pressure I feel on the job.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
47	The degree to which the company genuinely cares for the welfare of its employees.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
48	The way this company provides an efficient, cost-effective product/service to the customers.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
49	The degree to which I have a reasonable amount of control over areas for which I am responsible.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
50	The degree of support we received from other departments when we are trying to accomplish a task.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
51	The management skills of those in supervisory positions.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Part II

ORGANISATIONAL EXCELLENCE EVALUATION

Answer A

For each of the statements below, ask yourself whether you believe the statement is descriptive of your organisation. Give your answer by a (✓) in the appropriate box on the 7-point scale.

(-3) Strongly Disagree.
(-2) Somewhat disagree.
(-1) Slightly disagree.
(0) Neither agree nor disagree.
(1) Slightly agree.
(2) Somewhat agree.
(3) Strongly agree.

Answer B

For each of the statements below, ask yourself whether you feel that the situation described by each statement is improving or deteriorating since you joined the company. Again, give your answer by a (✓) in the appropriate box on the 7-point scale.

(-3) Obviously deteriorating
(-2) Somewhat deteriorating .
(-1) Slightly deteriorating.
(0) Remain the same.
(1) Slightly improving.
(2) Somewhat improving.
(3) Obviously improving.

		Answer A							Answer B						
		Strongly disagree	Somewhat disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Somewhat agree	Strongly agree	Obviously deteriorating	Somewhat deteriorating	Slightly deteriorating	Remain the same	Slightly improving	Somewhat improving	Obviously improving
		-3	-2	-1	0	1	2	3	-3	-2	-1	0	1	2	3
1	All the members of this organisation know exactly what we stand for and what we are trying to achieve.														
2	Our staff have a high commitment to one another.														
3	In our organisation, we are not afraid of failure. We are willing to make mistakes and to encourage innovation.														
4	In this organisation we focus on the things we do well and don't try to do things we are not equipped to do well.														
5	There is a strong loyalty to the organisation.														
6	Most of us in this organisation feel that we are the "best" in our field and take a great deal of pride in that fact.														

	Answer A	Answer B
	Strongly disagree Somewhat disagree Slightly disagree Neither agree nor disagree Slightly agree Somewhat agree Strongly agree	Obviously deteriorating Somewhat deteriorating Slightly deteriorating Remain the same Slightly improving Somewhat improving Obviously improving
	-3 -2 -1 0 1 2 3	-3 -2 -1 0 1 2 3
7 Top Management is clearly interested in the welfare of the staff and demonstrates this in action as well as words.	☐☐☐☐☐☐☐	☐☐☐☐☐☐☐
8 Our customers definitely look upon our company as providing excellence in our services. We have a definite reputation for excellence.	☐☐☐☐☐☐☐	☐☐☐☐☐☐☐
9 I know that I have the trust and respect of my supervisor.	☐☐☐☐☐☐☐	☐☐☐☐☐☐☐
10 This organisation spends a great deal of time and effort trying to identify the current and future needs of our markets so that we can better tailor our services to meet those needs.	☐☐☐☐☐☐☐	☐☐☐☐☐☐☐
11 Top management in this organisation knows the staff well because he spends time with the staff.	☐☐☐☐☐☐☐	☐☐☐☐☐☐☐
12 There is no doubt that an investment in the organization is a good one. We use our resources very well.	☐☐☐☐☐☐☐	☐☐☐☐☐☐☐
13 We are constantly seeking to improve the way we do things both in our management and services.	☐☐☐☐☐☐☐	☐☐☐☐☐☐☐
14 The organisation as a whole demonstrates a strong sense of teamwork and cooperation.	☐☐☐☐☐☐☐	☐☐☐☐☐☐☐
15 Our organisation is flexible, and adapts quickly and effectively to the problems and opportunities that confront us.	☐☐☐☐☐☐☐	☐☐☐☐☐☐☐
16 Most of our staff feel that they are part of a winning team and that they personally play an important role in its success.	☐☐☐☐☐☐☐	☐☐☐☐☐☐☐
17 In our organisation, the client/customer is truly our most important concern.	☐☐☐☐☐☐☐	☐☐☐☐☐☐☐
18 All of us feel that our relationship with our corporate head-quarters staff is a sound partnership, not a "we-they" relation-ship. Headquarters is not an obstacle to overcome, but partner that helps us to provide better service to the customers.	☐☐☐☐☐☐☐	☐☐☐☐☐☐☐
19 In general the control systems we have are not designed to limit or restrict employee behaviors but help us to improve our operations and encourage and release employee efforts.	☐☐☐☐☐☐☐	☐☐☐☐☐☐☐

	Answer A							Answer B						
	Strongly disagree	Somewhat disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Somewhat agree	Strongly agree	Obviously deteriorating	Somewhat deteriorating	Slightly deteriorating	Remain the same	Slightly improving	Somewhat improving	Obviously improving
	-3	-2	-1	0	1	2	3	-3	-2	-1	0	1	2	3
20 In our organisation, we are action oriented. We like to get things done and don't spend more time than we should analyzing the alternatives.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
21 We try to keep things simple and lean. Our structure and information systems are designed to give control as far down in the organisation as possible and to encourage freedom of action and responsibility.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
22 The support staff really support us. They look at their jobs as assisting and not "keeping an eye on things".	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
23 In our organisation we are interested in results. We are not so concerned about requiring everyone to do his/her job in some prescribed way, but focus on getting the job done.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
24 In this organisation we don't spend a lot of time or energy complaining or explaining why something that should be done can't be done. We work on finding ways to do it.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
25 This organisation encourages and rewards excellence in performance. For the most part, our employees would not choose to work anywhere else.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Part III

AGILITY AUDIT

Answer A

For each of the statement below, ask yourself whether you believe the statement is descriptive of your organisation. Give your answer by a (✓) in the appropriate box on the 7-point scale.

(-3) Strongly Disagree.
(-2) Somewhat disagree.
(-1) Slightly disagree
(0) Neither agree nor disagree.
(1) Slightly agree.
(2) Somewhat agree.
(3) Strongly agree.

Answer B

For each of the statements below, ask yourself whether you feel that the situation described by each statement is improving or deteriorating since you join the company. Again, give your answer by a (✓) in the appropriate box on the 7-point scale.

(-3) Obviously deteriorating
(-2) Somewhat deteriorating .
(-1) Slightly deteriorating.
(0) Remain the same.
(1) Slightly improving.
(2) Somewhat improving.
(3) Obviously improving.

	Answer A	Answer B
	Strongly disagree (-3) / Somewhat disagree (-2) / Slightly disagree (-1) / Neither agree nor disagree (0) / Slightly agree (1) / Somewhat agree (2) / Strongly agree (3)	Obviously deteriorating (-3) / Somewhat deteriorating (-2) / Slightly deteriorating (-1) / Remain the same (0) / Slightly improving (1) / Somewhat improving (2) / Obviously improving (3)
1 The products can be easily customized for an individual customer.	☐	☐
2 Management recognizes and rewards teamwork, not only individual performance metrics.	☐	☐
3 Employees believe that management encourages sharing, cooperation and team work.	☐	☐
4 Quality is measured in customer delight over time, not merely by defect rates.	☐	☐
5 Employees' education is considered as an enhancement to the company instead of just the employees themselves.	☐	☐
6 The decision to partner is a first alternative rather than a last resort.	☐	☐

	Answer A	Answer B
	Strongly disagree Somewhat disagree Slightly disagree Neither agree nor disagree Slightly agree Somewhat agree Strongly agree	Obviously deteriorating Somewhat deteriorating Slightly deteriorating Remain the same Slightly improving Somewhat improving Obviously improving
	-3 -2 -1 0 1 2 3	-3 -2 -1 0 1 2 3
7	The organisation systematically determines what information products and/or services the customer(s) need or would benefit from.	
8	The organisation cooperates opportunistically across organisational lines.	
9	Products are conceived by teaming with the customer and suppliers, instead of conceiving by internal teams and keeping secret until announcement dates.	
10	The organisation charges separately for presales or postsales information and assistance.	
11	Risk can be taken not just at top level.	
12	People are considered as the scarcest resources.	
13	Management coaches and inspires, not just directs the employees.	
14	Manufacturing processes and methods of products creation are part of the infrastructure and are easily accessible to all teams in the company.	
15	Employees are aware of the bottom-line condition and how they might have an impact on it.	
16	Compensation is skill-based instead of task-based.	
17	Management is constantly reinventing and reengineering the organisation.	
18	Products and services are reconfigurable and *flexible.*	
19	The organisation is proactive with its customers.	
20	The profit centers are getting more independent.	
21	The organisation sells skills, knowledge, and information in a relationship over time, not just products in sales transactions.	
22	The organisation focuses on customer satisfaction instead of on product shipment.	

	Answer A							Answer B						
	Strongly disagree	Somewhat disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Somewhat agree	Strongly agree	Obviously deteriorating	Somewhat deteriorating	Slightly deteriorating	Remain the same	Slightly improving	Somewhat improving	Obviously improving
	-3	-2	-1	0	1	2	3	-3	-2	-1	0	1	2	3
23	Customers turn to the organisation for rapid-response special requests.													
24	The organisation charges customers explicitly for design activity, not just recover design cost by allocating to production parts.													
25	The organisation focuses on customized product opportunities, not just on standard products.													
26	Employees cooperate and work in teams, not just focus on departmental goals and assignments.													
27	The products have automatic self-diagnosis capability when they malfunction or begin to fail.													
28	Employees at all levels contribute to decisions.													
29	The organisation has a track record of trustworthiness, and be preferred as a partner.													
30	The organisation is dynamic and effective *at meeting* changing goals and objectives.													
31	The organisation optimizes for mass customization instead of mass production.													
32	Information is not held for power but distributed to empower people.													
33	Employee compensation is based on the contribution of employees to the bottom line.													
34	Management manages core skills and competencies, not just the products and product lines.													
35	Those who carry out tasks are able to make decisions which affect their ability to perform the tasks better and faster.													
36	Information is readily available to those who need it through an enterprisewide information system.													
37	organisational walls that impede the organisation's efforts to meet customer needs are being eliminated.													

	Answer A							Answer B						
	Strongly disagree	Somewhat disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Somewhat agree	Strongly agree	Obviously deteriorating	Somewhat deteriorating	Slightly deteriorating	Remain the same	Slightly improving	Somewhat improving	Obviously improving
	-3	-2	-1	0	1	2	3	-3	-2	-1	0	1	2	3
38	The organisation can decide on and implement appropriate courses of action in the face of change.													
39	Management trusts and empowers employees, not polices and audits them.													
40	The organisational structure facilitates concurrency throughout the enterprise.													
41	Levels are being taken out of the organisational hierarchy.													
42	Management measures the value of the information content of products and services.													
43	Each profit and loss (P & L) units can establish its own specific goals within a broad mission statement.													
44	Major suppliers are treated as trusted partners.													
45	The organisation uses cross-functional customer teams.													
46	Mix of available manufacturing processes is constantly changing.													
47	Automated documentation is part of the product feature.													
48	Management is macromanaging instead of micromanaging people.													
49	People skills and knowledge are treated as assets.													
50	The customers can just deploy and benefit from what the company sells them.													
51	Decisions on alternative actions are based on bottom-line measures, not just on sales volume, margin, and unit costs.													
52	Employees focus on organisational success instead of personal security.													
53	The organisation explicitly looks for opportunities to add profitable services or other value to its products.													
54	Compensation is based on a combination of performance, time and rate, instead of just on time and rate.													

	Answer A							Answer B						
	Strongly disagree	Somewhat disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Somewhat agree	Strongly agree	Obviously deteriorating	Somewhat deteriorating	Slightly deteriorating	Remain the same	Slightly improving	Somewhat improving	Obviously improving
	-3	-2	-1	0	1	2	3	-3	-2	-1	0	1	2	3
55 Speed of organisational decision making is rapid.														
56 An asset value is placed on the information sold.														
57 Information content of products and services is growing.														
58 The organisation both protects and shares intellectual property.														
59 Risk takers, who fail sometimes, are rewarded for initiative.														
60 The organisation looks for high-value solutions, not merely for high-margin products.														
61 The organisation *measures* how much effort its customers will undertake to benefit from the products the organisation *sells*.														
62 The organisation has a system with which to track the content of the information products to keep versions, compatibility, and accuracy issues under control.														
63 The organisation's performance constantly exceeds the expectations of the customers.														
64 Employees can relate the bottom-line compensation to actions they took.														
65 The products provide users with instructions and/or assistance in how to use them effectively.														
66 Communication is two-way instead of top-down.														
67 Management attention focuses on core competencies, not just on factory efficiency.														
68 The organisation is organized by customer opportunity teams instead of functional departments.														
69 Employees are asked to think and make decisions.														
70 The clients value the information the organisation provides instead of just paying for physical products.														
71 The organisation benchmarks and invests in its core competencies.														
72 Change and apparent chaos are recognized as opportunity.														

Part IV

STRIVING FOR CONTINUOUS IMPROVEMENT

For each of the items listed below, please indicate how relevant you think the action, programme or concept described is toward the improved performance in recent years in PCAP. You may rate each item from 0 (not relevant) to 10 (highly relevant and important) and give your answer by a (✓) in the appropriate box. If you have no idea of what is described, put a (✓) in the box N.A.

		Not relevant 0	1	2	3	4	5	6	7	8	9	Highly relevant & important 10	N.A.
1	3C Slogan - Challenge, Change & Charge												
2	4M Slogan - Manufacturing Centre Materials Centre Marketing Centre Management Centre												
3	5S (Seiri, Seiton, Seiso, Seiketsu, Shitsuke) for discipline, housekeeping and cleanliness												
4	ISO9000 Quality Management System												
5	World Class Manufacturing concept- - Products of superior quality and reliability - Responsiveness to customer needs - Customer's total satisfaction - Unquestioned honesty, fairness and integrity												
6	JIT (Just-In-Time)												
7	Use of Cross-Functional Task Forces to tackle problems												
8	SIOP (Sales, Inventory and Operations Planning)												
9	TQM (Total Quality Management)												
10	Cost of Quality (COQ)												
11	Cost Reduction												
12	Concurrent Engineering												
13	PACE (Product and Cycle-time Excellence)												
14	Operators Training												
15	Supervisory Skills Training												
16	Annual Management Workshop for managers												
17	Sponsorship to external training programmes (short courses)												

	Not relevant 0 1 2 3 4 5 6 7 8 9 10 Highly relevant & important	N.A.
18 Sponsorship to external education programmes (e.g. High Cert, MSc, MBA)	☐☐☐☐☐☐☐☐☐☐☐	☐
19 Scheme A Training for Graduate Engineers	☐☐☐☐☐☐☐☐☐☐☐	☐
20 Deming's Principles of Quality Management	☐☐☐☐☐☐☐☐☐☐☐	☐
21 Ship-to-Stock Programme	☐☐☐☐☐☐☐☐☐☐☐	☐
22 Vendor Management Programme and Vendor Audit	☐☐☐☐☐☐☐☐☐☐☐	☐
23 Automatic Testing Equipment	☐☐☐☐☐☐☐☐☐☐☐	☐
24 C.C. mail, LAN and WAN installation	☐☐☐☐☐☐☐☐☐☐☐	☐
25 DOE (Design of Experiments, Taguchi Method)	☐☐☐☐☐☐☐☐☐☐☐	☐
26 QIS (Quality Information System)	☐☐☐☐☐☐☐☐☐☐☐	☐
27 HALT (Highly Accelerated Life Test)	☐☐☐☐☐☐☐☐☐☐☐	☐
28 Vertical Market Segmentation (Focus on telecom and datacom markets)	☐☐☐☐☐☐☐☐☐☐☐	☐
29 Establishment of R & D team	☐☐☐☐☐☐☐☐☐☐☐	☐
30 Patent Award Program	☐☐☐☐☐☐☐☐☐☐☐	☐
31 Outstanding Achievement Award and Night in the Town Award	☐☐☐☐☐☐☐☐☐☐☐	☐
32 Establishment of Global Procurement Team	☐☐☐☐☐☐☐☐☐☐☐	☐
33 TQRDC	☐☐☐☐☐☐☐☐☐☐☐	☐
34 Logistic Management (air versus sea shipment, direct shipment to customers, etc.)	☐☐☐☐☐☐☐☐☐☐☐	☐
35 Expansion of Zhong Shan Plant	☐☐☐☐☐☐☐☐☐☐☐	☐
36 Preferred Parts Programme	☐☐☐☐☐☐☐☐☐☐☐	☐
37 Upgrade of ASK System	☐☐☐☐☐☐☐☐☐☐☐	☐
38 Installation of Hyperion for financial data consolidation	☐☐☐☐☐☐☐☐☐☐☐	☐
39 CAD (Computer Aided Design)	☐☐☐☐☐☐☐☐☐☐☐	☐
40 MBO (Management by Objective)	☐☐☐☐☐☐☐☐☐☐☐	☐